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SUMMARY OF RECENT ABSTRACTS*

II. YELLOW FEVER

General : Epidemiology

POZZO (p. 841) has written a monograph on yellow fever.

ELTON and JOHNSON (p. 732) describe the pathological features of yellow fever as they have observed them in cases occurring in the Panama Canal area.

SMITHBURN *et al.* (p. 229) carried out surveys to detect immune bodies to yellow fever in serum from Kenya and many other countries of East Africa, and from Egypt, Arabia and Somalia. Only sera from women and children were examined, so that positive reactions due to immunization with vaccine could be avoided. The technique used was sensitive. Positive results were found in all countries except Arabia and Swaziland, and the highest incidence was in N. Rhodesia.

LAEMMERT *et al.* (p. 30) investigated the state of immunity of forest monkeys in part of Brazil where there had been an epidemic in man in 1935, but which had not been affected by another epidemic in 1945, though the latter had approached it closely. Immune bodies were found in 10·75 per cent. of 1,166 sera from 1,153 monkeys, and all except 2 of the 120 immune animals were adults. In another area, where human disease occurred in 1945, immune bodies were found in monkeys of all ages. These cebus monkeys have a very limited home range, and yellow fever is rarely fatal. The evidence suggests that the infection is spread by infected mosquitoes in the isolated forest patches of the area. It seems that in 1945 yellow fever did not spread in monkeys beyond the areas in which it was found in man.

Transmission

GEIGY and GANDER (p. 498) show that the egg of *Aëdes aegypti* is very resistant to desiccation, and that the embryo can remain alive for one year if the relative humidity does not fall below 70 per cent. Hatching of the egg is related to the oxygen content of the surrounding medium, whether water or air. A low oxygen content favours hatching, but the mechanism of the reaction is not yet known.

*The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1950, v. 47. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

HADDOW and MAHAFFY (p. 230) studied the mosquitoes of forest canopy in Bwamba County, Uganda, by catches made around sunset at various heights from the ground during 11 weeks. *Aëdes africanus* was the most common mosquito, but *Anopheles gambiae* was also fairly common. Large-scale feeding experiments with *Aëdes africanus* failed to reveal the presence of yellow fever virus in them, and inoculation of suspensions of 4,553 mosquitoes was similarly unsuccessful. The authors think that the morphological differences between *Aëdes africanus* and *Aëdes luteocephalus* are not great enough to warrant full specific rank for the latter. BRUCE-CHWATT (p. 951) states that the insect responsible for transmission of jungle yellow fever in West Africa has not yet been incriminated. He confirms the fact that *Aëdes africanus* bites mainly at dusk. He has studied the dispersal of *Aëdes aegypti* marked by salts of radio-active phosphorus or strontium ; the maximum distance of recovery was 3,800 feet from the point of release. MATTINGLY (p. 304) finds that in Southern Nigeria, as in Uganda, *Aëdes africanus* bites mainly at tree-top level, and in the evening twilight.

WADDELL (p. 31) describes the experiments of WHITMAN, TULLOCH and herself in 1940 by which transmission of yellow fever by *Aëdes leucocelaenus* was proved. She shows that this mosquito is slightly more effective than *Aëdes aegypti* as a transmitter, but that other vectors (*Haemagogus capricorni*, *H. spegazzinii* and others) are less so. CERQUEIRA and BOSHELL-MANRIQUE (p. 130) compared specimens of *Haemagogus spegazzinii* from Argentina with others from Brazil and Bolivia, finding that they were all obviously of the same species. Specimens from Brazil were identical with those found earlier by ANTUNES and WHITMAN to transmit yellow fever, and recorded as *H. janthinomys*, which is a synonym of *H. spegazzinii*. BATES (p. 230) has experimented with *Haemagogus spegazzinii falco* (which is the name now given to the Colombian vector of yellow fever formerly known as *H. capricorni*) in relation to length of life cycle, survival, and incubation period of the virus of yellow fever. Conditions in which atmospheric temperature varies from 25° to 35°C. daily are probably most favourable for the mosquito and the virus. At some other temperature (*e.g.* 25°C. without a rise) the average survival period was 18·3 days, but the minimum incubation period for the virus was 28 days.

CAUSEY *et al.* (p. 977) in experiments on marked mosquitoes, found that *Haemagogus spegazzinii*, perhaps the most important vector of jungle yellow fever in Brazil, can be recovered as far as 11·5 kilometres from the point of release, and *Aëdes leucocelaenus* 5·7 kilometres. It seems that yellow fever virus may be disseminated by the movement of insect vectors in regions of small residual forest with open pasture and cultivated fields. There was no evidence that mosquitoes had travelled against the prevailing wind.

Control

EDWARDS (p. 231) describes the measures taken at Port Sudan to control *Aëdes aegypti*. Mosquito control workers have been increased, and regulations have been enforced in relation to dhows, ships, trains and aircraft. Two areas, round the quays and the airfield, have been kept entirely free from *Aëdes* during the last 3 years.

Charles Wilcocks

MALARIA

CHOZA FERRER, J. A. & PINERO CARRILLO, J. F. Diez años de lucha antipalúdica. [**Ten Years of Antimalarial Activity.**] *Rev. Clin. Española.* 1950, Aug. 15, v. 38, No. 3, 199–201, 2 figs. English summary (3 lines).

This is an account of malaria incidence during the ten years 1940–1949 in a rural district in the south of the Badajoz Province, Spain, comprising the towns

Villafranca de los Barros, Ribera del Fresno, Santos de Maimona and Fuente del Maestre. The total population of the area is 39,768. The first half of this decade was characterized by an epidemic of malaria which reached its height in 1942. The number of cases of malaria treated in the dispensary in that year totalled 2,043. Thereafter the epidemic rapidly declined : in 1949 only 120 cases of malaria were seen in the dispensary. Several factors probably contributed to the epidemic prevalence culminating in 1942, scarcity and malnutrition resulting from war conditions, importation of new strains of parasite from Morocco by colonial troops and insufficient antimalarial drugs. With a return to more normal conditions the incidence of malaria fell rapidly.

Norman White

MÖLLHAUSEN, W. Malaria und Wasserbau in Griechenland. [**Malaria and Waterworks in Greece.**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1950, July, v. 2, No. 1, 79–82, 1 map.

The moral of this paper is contained in the author's comment to the effect that water engineers in hot climates may do more harm than good unless they work in concert with hygienists and malariologists. The lesson is illustrated by a general discussion on the situation in Greece, exemplified by some works in Macedonia, in the neighbourhood of which during 1941 to 1943 the local splenic index ranged between 24 to 93 per cent. *B. G. Maegraith*

MÖLLHAUSEN, W. Zur Virulenz der griechischen Malaria. [**The Virulence of Malaria in Greece.**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1950, July, v. 2, No. 1, 75–8, 1 chart.

Allied troops in 1915–19 and German forces in 1941–44 were exposed in Greece, particularly in the north, to unusually severe malaria. Frequently relapsing *P. vivax* malaria was common, sometimes infecting whole units, but the serious nature of the *P. falciparum* attacks was especially notable. In the recent campaigns the malignant nature of the *falciparum* malaria may have been a factor in the unsatisfactory results of suppressive atebrin [mepacrine] therapy in German troops (60 mgm. daily during the summer). In both wars thousands of troops who had previously hardly ever come into contact with the disease were exposed to malaria and this susceptible population suffered severely. The indigenous inhabitants were also affected more than is usual in malarial regions ; deaths from malaria in children exceeded those due to all other causes, a fact which neutralized the high birth rate. Adults were also fequently infected, and this often seriously influenced their capacity for work and so the local agricultural economy. The author draws a striking picture of the prevailing conditions, one sentence of which might be translated : "The exhausted adults drag themselves sluggishly around and one can observe from afar the ruined fields and houses when malaria dominates the picture."

The author discusses possible explanations of the appearance of this unusually vicious malaria. Among the points he makes are : (i) because of variation in immunity reactions, seasonal malaria is apt to be more severe than non-seasonal ; (ii) the Greek scene is made up of many widely differing geographic and human patterns ; (iii) the conditions under which mosquitoes have to breed vary locally and according to the season. For example, an unusually dry summer may lead to shortage of water for mosquito breeding, and thus to a low malaria incidence, which adversely affects the immunity reactions of the inhabitants ; (iv) unusual spread of mosquitoes ; (v) the constant interchange of persons from one area to another or from outside Greece, promoting

the spread of strains of parasites into communities unaccustomed to them. Greece has been since ancient times the most restless corner of Europe, subject to population movements in war (*e.g.*, refugees) and to incessant trade and commerce in peace ; (vi) local inhabitants do not usually recognize and properly treat malaria as such. They take quinine for a fever, but only for so long as the body temperature is raised. Inefficient treatment of this sort, the author believes, breeds out the more resistant and difficult malaria strains ; (vii) the diet of the native people is poor, lacking in both protein and vitamins. This makes them more susceptible to malaria.

[An interesting and thoughtful paper.] *B. G. Maegraith*

PICASO GUILLEN, J. El paludismo en el ejercito. Un metodo original para el examen parasitologico de la sangre. [**Malaria in the Army. An Original Method for Parasitological Examination of the Blood.**] *Med. Colonial.* Madrid. 1950, Sept. 1, v. 16, No. 3, 226–46, 6 figs.

The first part of this paper touches on the importance of malaria in military history, both as a complication of military operations and the wide extensions of malaria prevalence that have often followed in the wake of wars. Reference is made to the gigantic effort that the U.S.A. and other Western powers were called upon to make to control malaria in the second world war.

The second part describes the evolution of endemic malaria among the garrison of Larache (Spanish Morocco) during the five years 1945–49, a garrison numbering some 14,000. The number of cases of malaria treated during this period in the clinics of the Military Hospital was 9,427. This figure includes both fresh infections and relapses. There were 8,239 *P. vivax* infections, 1,186 *P. falciparum*. There was a remarkable decline in the number of cases reported in these five years, the totals being 3,241, 2,229, 1,682, 1,497 and 778. *P. falciparum* infections have almost disappeared : these were most numerous in 1946, 809 cases ; in 1948 and 1949 there were only 3 and 7 respectively. Several factors appear to have been concerned with the declining prevalence. The mosquito density has diminished ; breeding places are fewer and DDT has played some part. The prophylactic distribution of atebrin [mepacrine] has been employed. The more thorough treatment of patients has resulted in fewer relapses and fewer carriers of infection.

The third part of the paper describes a method of blood examination which facilitates the discovery of parasites when these are few in number : it is a concentrated thick drop method. A solution is made consisting of sodium citrate 4 gm., gum arabic 3 gm., glucose 10 gm., distilled water 100 gm. One cc. of this solution is mixed with 4 cc. of the patient's blood in a test tube, shaken lightly and allowed to stand for an hour, by which time the red cells will have sedimented. These are pipetted off leaving the plasma and most of the leucocytes. The contents of the pipette are placed in a centrifuge tube which is then filled with freshly distilled water. The tube is centrifuged for 10 minutes at 2,000–3,000 r.p.m. A thick drop is made with the sediment, which, when dried, is washed and stained in the usual manner. For further details of the method the original paper should be consulted. *Norman White*

FAUST, E. C., SCOTT, J. A. & TAYLOR, J. E. **Malaria Mortality and Morbidity in the United States for the Years 1946, 1947 and 1948.** *J. National Malaria Soc.* 1950, Sept., v. 9, No. 3, 195–204.

This report includes information collected from the Boards of Health laboratories of all the States and some other political subdivisions of the U.S.A. regarding the results of blood examinations for malaria, cases of malaria

notified to the bureaux of vital statistics and malaria mortality data for each of the three years 1946–48. The number of deaths attributed to malaria were 329, 206 and 155 in the three years respectively. This downward trend was evidenced in all of the previously highly malarious southern States. An unknown number of these deaths are attributable to infections contracted outside the U.S.A. The only States in which deaths from malaria reached double figures in 1948 were Alabama, Arkansas, Florida, Louisiana, Mississippi and Texas. There was no constant relationship between laboratory returns and notified malaria cases. The laboratory-confirmed cases represent only a portion of the total cases of malaria, whereas the cases reported to the bureaux of vital statistics are sometimes overestimated and unreliable as a gauge of the amount of malaria in the U.S.A.

The *P. vivax*, *P. falciparum*, *P. malariae* and untyped infections reported from the laboratories were : *1946*, 6,174 ; 56 ; 39 ; 1,889 : *1947*, 1,670 ; 20 ; 13 ; 505 : *1948*, 326 ; 13 ; 8 ; 135. The cases reported to the bureaux of vital statistics in the three years numbered 48,780, 16,258 and 9,921.

Detailed figures are given in a table and notes are given regarding each State individually. *Norman White*

VAN DER KUYP, E. **Contribution to the Study of the Malarial Epidemiology in Surinam.** *Koninklijke Vereeniging Indisch Inst.* (*Roy. Inst. Indies*). Amsterdam. 1950, Meded. No. 89, Afdl. Trop. Hyg. No. 18, 146 pp., 4 diagrams & 4 maps. [132 refs.]

This is an important contribution to the malarial epidemiology of Surinam. Surinam (Dutch Guiana) lies between French Guiana on the east and British Guiana on the west. It is five times larger than the mother country but most of its surface is virgin jungle. Its total population is only 203,000 of whom 73,000 live in the capital Paramaribo. Thirty-nine per cent. of the population are Creoles, 28 per cent. of British Indian extraction, 17 per cent. Indonesians, 11 per cent. Bush Negroes, and only 0·8 per cent. Europeans. A coastal belt of swamp land, increasing in width from 30 to 100 km. from east to west, harbours most of the population. This is separated from the interior bush by a savannah belt. The interior is inhabited by Bush Negroes and some American Indians. Surinam has a tropical climate : the major rainy season extends from April to July, the major dry season from August to November. The most prevalent communicable diseases are malaria, hookworm disease, ascariasis, filariasis, trachoma and yaws. Paramaribo has a public water supply and a sewage disposal system. Sanitary conditions are very primitive in rural areas.

The interior of Surinam has long had an unenviable reputation for hyperendemic *P. falciparum* malaria. In the coastal region *P. vivax* malaria is most prevalent in some areas, *P. malariae* in others. The capital, the districts of Coronie and Nickerie, and the Para settlements are almost free from malaria. The most malarious areas on the coast are on both sides of the Surinam and Commewijne River estuaries.

Sixteen species of *Anopheles* have been found in Surinam but only those of the *Nyssorynchus* group are of importance in the transmission of malaria. For this reason the greater part of this report is devoted to a description of the classification, morphology and identification of species of this group. *A. darlingi*, the most dangerous vector, is restricted to the interior and to some parts of the Savannah belt and where this belt approaches the sea in the extreme east. In these areas it is responsible for hyperendemic malaria with spleen rates from 64 to 100 per cent. The coastal malaria is transmitted by one or more species of the *albimanus* series of which there are four : *A. aquasalis*, *A. oswaldoi*, *A. triannulatus davisi* and *A. nuñez-tovari* (and probably *A. strodei* and

A. noroestensis). *A. aquasalis* is the most widespread anopheline throughout the coastal belt : in the interior *A. triannulatus davisi* is the most prevalent of the *albimanus* series.

It is believed, but not proved, that *A. aquasalis* is responsible for most of the transmission in the coastal areas, as it is in some other American countries. There are anomalies, however. In the Coronie and Nickerie districts, which are practically malaria-free (spleen rates [1939] in children 0·4 and 1·7 per cent.) *A. aquasalis* is prevalent. The author assumes that there are different varieties of this species, though a close study of all stages of the life cycles of *A. aquasalis* from malarious and non-malarious areas failed to reveal any taxonomic differences. *Norman White*

SHORTT, H. E. **Recent Advances in our Knowledge of the Malaria Parasite.** *Brit. Med. J.* 1950, Sept. 9, 606–8.

In this paper, which was read at the 1st International Congress of Internal Medicine in Paris, the author gives a concise account of the discoveries by himself and his co-workers of the exoerythrocytic stages in the human and simian malaria parasites. In introducing the subject, he notes that the failure of previous workers to detect the tissue forms of mammalian plasmodia was due to the use of insufficient numbers of infected mosquitoes in their experiments. This technical defect was remedied in his own investigations, with the well-known results. The descriptions of the pre-erythrocytic development of *Plasmodium cynomolgi*, *P. vivax* and *P. falciparum* have already been published elsewhere [see this *Bulletin*, 1948, v. 45, 388, 482 ; 1950, v. 47, 193], but in the present paper the author takes the opportunity to make some deductions from his observations. Thus, it is pointed out that there is now strong evidence that the cycle of development in the liver not only persists after the erythrocytic cycle has been established, but it may even continue after the termination of the blood infection. The exoerythrocytic cycle probably represents the source of relapses, the genesis of which is visualized as follows. The active immunity acquired by an animal in the course of an infection brings about the destruction in the blood of the merozoites produced by erythrocytic and exoerythrocytic schizogony, while the liver schizonts, being beyond the reach of immune bodies, are unaffected and serve to propagate the tissue stages. But if, for any reason, the effectiveness of immunity is reduced, the merozoites originating from the liver schizonts succeed in invading the erythrocytes, thereby producing a relapse blood infection. *C. A. Hoare*

LAVEN, H. Der Schuppenindex als Unterscheidungsmerkmal der Arten in der *Anopheles maculipennis*-Gruppe. [**The Scale Index as a Differential Characteristic of Species in the *Anopheles maculipennis* Group.**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1950, July, v. 2, No. 1, 111–24, 5 figs. [18 refs.]

Investigations are recorded on the shape and size of wing scales of members of the *Anopheles maculipennis* complex in furtherance of work by UNGUREANU [this *Bulletin*, 1947, v. 44, 557], and UNGUREANU and SHUTE [*ibid.* 1948, v. 45, 136]. The usefulness of this method, employed in this instance as a means of separating adults of *A. m. atroparvus* and *A. m. messeae* in north-west Germany, is confirmed. Specimens caught in nature and those bred in the laboratory gave consistent results despite differences in the size of mosquitoes from different environments. *M. T. Gillies*

STEINIGER, F. Die Malaria-Überträger Schleswig-Holsteins. [**Malaria Transmission in Schleswig-Holstein.**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1950, July, v. 2, No. 1, 94–106, 3 figs. [23 refs.]

The distribution and habits of the members of the *Anopheles maculipennis* complex found in the Schleswig-Holstein region are discussed in the light of the widespread occurrence of autochthonous malaria since the end of the 1939–45 war.

A. m. atroparvus was most abundant along the North Sea coastal marshes and *A. m. messeae* in the drier inland districts, but both types were commonly found throughout both areas. *A. m. typicus* was present in relatively small numbers and was confined to the eastern half of the province which faces the Baltic Sea. *A. claviger* is found in very small numbers and is therefore unimportant as a transmitter of malaria. Apart from natural breeding sites, extensive anopheline breeding was found in water-filled bomb craters in the vicinity of Kiel where these were not covered with a growth of *Lemna*.

No long-range flights of anophelines comparable to those observed in Holland appear to occur in Schleswig-Holstein. Females fly further afield in the autumn before hibernating and are often found in large numbers in houses from which they were absent all through the summer. This has the effect of ensuring the widespread reoccupation in the spring of breeding sites which may have dried up the previous summer. This is particularly marked in the drier inland areas where rapid recovery of the anopheline population is observed in the year following a dry season. *M. T. Gillies*

BERNET. Les heures d'agressivité du *A. gambiae* en A.O.F. [**The Hours of Biting of *Anopheles gambiae* in French West Africa.**] *Méd. Trop.* Marseilles. 1950, May–June, v. 10, No. 3, 564–5.

Although *Anopheles gambiae* is able, sometimes, to bite at all hours of day and night, it is far more prone to feed during certain hours of darkness. It has been noted that, in human dwellings, there are two main peaks of activity during the night ; one not long after dark, and the other between 2 and 3 a.m. The author considers that these peaks are associated with the previous history of the mosquitoes. The first wave is composed of insects that have been resting in the neighbourhood of the building ; the second wave is due to arrival of newly-emerged females, probably virgins. (Observations of the prevalence of mosquitoes in a guardroom in Madagascar support this. The numbers arriving late at night varied in accordance with the extent of anti-larval measures on neighbouring sites on the previous day.)

The actual peak of activity of the first group of mosquitoes in French West Africa appears to be at about 9·30 p.m. This is the most important attack, for most people will be protected by bed mosquito nets at the time of the later one. Men doing sedentary work in the evening and babies not protected by face nets are liable to be bitten. It is suggested that vigorous spraying of insecticide should be done between 8·30 and 9 p.m. *J. R. Busvine*

WHARTON, R. H. **Daytime Resting Places of *Anopheles maculatus* and other Anophelines in Malaya, with Results of Precipitin Tests.** *Med. J. Malaya.* 1950, June, v. 4, No. 4, 260–71, 1 text fig. & 4 figs. on 2 pls. [20 refs.]

This paper records some interesting findings of anophelines resting by day in vegetation in Malaya. *Anopheles maculatus* was the commonest species and the majority of specimens were found to have had a recent blood meal.

In general few Malayan anophelines are endophilic, so the author instituted systematic searches of vegetation in the vicinity of labourers' lines and cattle sheds on a rubber estate, where breeding sites of *A. maculatus* in the form of small streams and ravines abounded. Searching was carried out by trained assistants using hand catching with cyanide tubes, and catches on different occasions yielded results varying from 1 to 13 anophelines per man-hour. It was found that the densely shaded banks of streams had a relatively small population of anophelines. Rather they favoured the more open type of vegetation under trees, represented mostly by the common Malayan bracken fern. *A. maculatus* was by far the commonest anopheline found under these conditions, usually within a few inches of the ground where the bracken was 1–2 feet high and sheltered but reasonably free of access. Of the other 8 species of anophelines found, *A. hyrcanus* and *A. barbirostris* were usually found at a greater height from the ground, *A. aconitus* in more secluded spots and *A. philippinensis* in vegetation where ferns were replaced by sedges and small bushes.

Analysis of the specimens captured showed that there were more than six times as many females as males of *A. maculatus*. Of these females approximately two-thirds contained fresh blood while the remainder were gravid or unfed indicating that adults in all stages of development make use of the same daytime harbourages. Dissections showed that maturation of the ovaries was complete 48 hours after a single blood meal and this same period appeared to hold good for several other of the species concerned. *A. vagus*, however, probably completes the whole cycle in 24 hours. Precipitin tests showed that 20 per cent. of *A. maculatus* had fed on man and nearly all of the remaining 80 per cent. on cattle. Of the other species only 7 per cent. of *A. hyrcanus* and a single specimen of *A. karwari* had fed at all on man. *M. T. Gillies*

SMITH, H. F., DY, F. J. & DEL ROSARIO, F. G. **Observations on the Breeding Habits of *Anopheles minimus flavirostris*.** Reprinted from *Acta Med. Philippina*. 1950, Jan.–Mar., v. 6, No. 3, 191–3.

Larvae of *Anopheles minimus flavirostris* (the principal malaria vector in the Philippines) are here recorded as having been found in rice fields, behind boulders in mid-stream, in water having a temperature of 38·5°C., in stagnant water and in brackish water.

Hitherto it was thought unlikely that larvae of this anopheline would be found in such places and they were neglected both in surveys and in control work, but these observations stress again the necessity for strict vigilance.

H. S. Leeson

PERRY, W. J. **Principal Larval and Adult Habitats of *Anopheles farauti* Lav. in the British Solomon Islands.** *Mosquito News*. 1950, Sept., v. 10, No. 3, 117–26, 6 figs. [18 refs.]

The author has travelled widely in the Solomon Islands, presumably during the war period ; he has carried out detailed work on the biology of *Anopheles farauti*. The larvae were found commonly along the margin of streams or rivers if there was emergent vegetation, but they were generally absent from clear running water without vegetation : they did not occur in rot holes, coconut shells, etc. They were commoner in places open to the sun than under shade. They were also found in fresh water swamps, hoof prints and the great variety of depressions in the ground that followed the occupation by the army, for instance, roadside ditches, wheel tracks and bomb craters. They did not

locate in "factitious containers" which the author explains as "tin cans, bottles or tyre casings". It seems that in different islands the breeding places varied to a considerable extent.

The adult mosquito was closely associated with man and generally found in huts, mosquito nets and so forth. They were, however, once or twice found in nature, but the precise positions are not described and there is no indication about the amount of time given to the search for resting places away from houses. The insect appeared to fly between 5 and 8 p.m. A distance of about 800 to 1,000 yards was the maximum which it would travel in going from its breeding place to where it fed on man.

It would be generally agreed that this insect is an important transmitter of malaria. The author says that it is also a common vector of filariasis, and that a high infection rate with *W. bancrofti* was found : on this point the evidence only shows that the mosquitos were infected with early stages of a nematode ; no evidence is brought forward as to identification, and no experiments on known carriers of the worm are reported.

[The author writes as if systematic difficulties have been disposed of, and as if six definite species occur in the area ; also as if he is unfamiliar with Australian work, the conclusions of which are difficult to reconcile with those of the American entomologists.] *P. A. Buxton*

MICKS, D. W. **The Lethal Effect of the Ciliate,** *Vorticella microstoma* **Ehrenberg on** *Anopheles quadrimaculatus* **Larvae.** *J. National Malaria Soc.* 1950, Sept., v. 9, No. 3, 256–8, 1 fig.

A laboratory colony of *Anopheles quadrimaculatus* was attacked and destroyed by the ciliate *Vorticella microstoma*. This appeared to be the primary invader and affected third and fourth instar larvae only. Colonies of *Aëdes aegypti* and *Culex fatigans* reared alongside remained uninfected, despite the deliberate introduction of infected anopheline larvae into their pans. This suggests that the *Vorticella* shows a specific host selectivity. *M. T. Gillies*

REHN, J. W. H., HENDERSON, J. M. & SERRANO, J. M. **Field Studies on the Bionomics of** *Anopheles albimanus*. **Part I : Aestivation of Immature Stages—Progress Report.** *J. National Malaria Soc.* 1950, June, v. 9, No. 2, 176–80, 2 figs.

Adults of *Anopheles albimanus*, the most important vector of malaria in Porto Rico, appear shortly after the beginning of the rains and it was thought that aestivation in an immature stage occurred.

Observations were made from November 1948 to April 1949 on fifteen breeding sites along 60 miles of coastline. At first all sites had high larval densities, but by early April they were nearly all dry. A series of 356 soil samples were taken, transferred to the laboratory and kept covered with water in a room free from mosquitoes. No anophelines appeared, but *Psorophora* larvae, psychodids and chironomids were found on several occasions. "These preliminary results would seem to indicate that no aestivation of the immature stages of *A. albimanus* occurs under these conditions." *H. S. Leeson*

REHN, J. W. H., MALDONADO CAPRILES, J. & HENDERSON, J. M. **Field Studies on the Bionomics of** *Anopheles albimanus*. **Parts II and III. Diurnal Resting Places—Progress Report.** *J. National Malaria Soc.* 1950, Sept., v. 9, No. 3, 268–79.

Inconclusive investigations into the daytime resting sites of *Anopheles albimanus*, an exophilic species, are reported from Porto Rico. Methods used

included direct searching, beating and sweeping of vegetation, keg-traps and the enclosing of vegetation under a mosquito-net followed by spraying with repellents. Findings were negative apart from those in the crevices of an isolated limestone cliff, which apparently served as a regular resting place, in one or two areas of vegetation, and under a single house that produced *A. albimanus* and *A. grabhami* in numbers insufficient for analysis.

M. T. Gillies

DE ZULUETA, H. **Biology of Adult Mosquitoes in Eastern Colombia.** *Nature.* 1950, July 29, 180–81.

The author refers to a previous paper in which he showed that the savannah, is the true habitat of certain mosquitoes in Colombia [see this *Bulletin*, 1950, v. 47, 953].

In this paper he briefly refers to a few experiments conducted in the same area which show that after the grass is cut there is a considerable drop in the number of female mosquitoes seeking blood. This reduction may be due to the failure of the mosquitoes to detect the bait or (less likely) to the repellent effect of the bare ground. On this plain land blood-seeking culicines have a longer flight range than anophelines and they generally fly higher.

A detailed account of the work is to be published elsewhere.

H. S. Leeson

CORREA, R. R., LIMA, F. O. & CODA, D. **Observations on the Flight and Longevity in Nature of** *Anopheles albitarsis domesticus.* *J. National Malaria Soc.* 1950, Sept., v. 9, No. 3, 280–84, 2 figs.

Staining experiments with *Anopheles albitarsis domesticus* in the São Paulo State of Brazil showed that the flight range may be up to 13 kilometres and survival of individuals for as long as five months.

A. a. domesticus was abundant in houses on the coast, but breeding sites were very scanty. Great numbers of larvae, however, were found on an island one kilometre off shore. In order to find out whether these larvae could be the source of the adults on the mainland, 4,700 adult mosquitoes were stained with methylene blue and released on the island. Two females were recaptured on the mainland about three weeks later. In a reverse experiment, 26 out of 2,240 mosquitoes marked with bronzing dust and released on the mainland were recovered on the island and it is considered that this return flight to preferred breeding sites may be general. Isolated marked specimens were also recaptured in other coastal villages up to 13 kilometres from the point of release [exact numbers collected and examined for stain from the more distant points are not stated]. Altogether, 1·69 per cent. of those marked were subsequently recovered. These experiments were done on March 22nd, yet 17 mosquitoes, the largest number recaptured on any one day, were recovered on May 20th, 60 days later, and two additional specimens were taken in June and August. The authors consider that house-spraying with DDT should be extended to all dwellings within a radius of 20 kilometres of the area to be protected.

M. T. Gillies

DEANE, L. M., VERNIN, C. S. & DAMASCENO, R. G. Avaliação das preferências alimentares das fêmeas de *Anopheles darlingi* e *Anopheles aquasalis* em Belém, Pará, por meio de provas de precipitina. [**Estimation by Precipitin Tests of Blood-Meal Preferences of Female** *A. darlingi* **and** *A. aquasalis* **in Belém.**] *Rev. Serviço Especial de Saúde Pública.* Rio de Janeiro. 1949, July, v. 2, No. 3, 793–808, 1 graph. [13 refs.] English summary.

In Belém, Brazil, the main vectors of malaria are *Anopheles darlingi* and *A. aquasalis.* Precipitin tests made on female mosquitoes captured inside

houses (*A. darlingi* 1,026 and *A. aquasalis* 596) showed that the anthropophilic index was very high for both species. Tests made with laboratory-bred mosquitoes (*A. darlingi* 230 and *A. aquasalis* 1,215) released into a large cage containing man, cat, dog, pig, sheep, cow, horse and chicken showed that *A. darlingi* had a marked preference for man, while *A. aquasalis* had no special liking for man, but preferred cow and horse. Over 91 per cent. of the tests were positive for a single host but some were positive for two and some for three.

The figures, converted to percentages, were :—

Host	From houses		Bred in laboratory	
	A. darlingi	*A. aquasalis*	*A. darlingi*	*A. aquasalis*
Man	85·3	71·8	45·7	10·9
Dog	5·6	9·7	—	5·7
Cat	0·1	—	—	1·7
Pig	1·2	0·2	0·4	3·0
Sheep	—	—	0·9	1·8
Cow	4·1	0·5	28·7	56·3
Horse	0·9	3·9	12·6	23·4
Chicken	0·8	1·2	—	0·4

The authors believe that more accurate data are to be obtained with mosquitoes raised in the laboratory and offered the choice of different baits than with mosquitoes caught in houses. *H. S. Leeson*

ALBERTO ALVARADO, C. & DEL PONTE, E. Investigaciones sobre la presunta existencia del *Anopheles gambiae* en el Paraguay. [**Study of the Suggested Presence of** *Anopheles gambiae* **in Paraguay.**] *Rev. Inst. Bacteriológ. Malbrán.* Buenos Aires. 1945–1948, v. 13, No. 1, 259–66.

In 1944, Dr. Boris PODTIAGUIN published an article in the *Revista de la Sociedad Cientifica del Paraguay,* announcing that *Anopheles gambiae* larvae had been found breeding in Paraguay. A further article in 1945 re-affirmed this claim and pointed out the danger of this mosquito. It was presumed that the insect had either crossed over from Brazil (during the period 1930–1940) or else it had been introduced again from Africa.

In view of the seriousness of this matter, a commission was set up to investigate the matter, consisting of two representatives each from Paraguay, Brazil and Argentina. This paper records their investigations which reached the conclusion that Podtiaguin had been mistaken as to the origin and identification of various specimens and that, in fact, there are no *A. gambiae* breeding in Paraguay. *J. R. Busvine*

PITTENDRIGH, C. S. **The Quantitative Evaluation of** *Kerteszia* **Breeding Grounds.** *Amer. J. Trop. Med.* 1950, May, v. 30, No. 3, 457–68, 4 figs.

The ecological factors are reviewed which affect the distribution of bromeliads and the anophelines that breed in them in Trinidad. Factors of importance are the species of bromeliad, their relative abundance and vertical distribution, the vertical distribution of the anophelines and the coincidence or non-coincidence of the vertical ranges of the plants and the mosquitoes.

Observations were made on natural larval populations of the bromeliads and on the experimental populations in artificial breeding plots. Vertical distribution of the bromeliads was plotted on to scale drawings of sample strips of plantation Immortelle trees.

Vertical distribution of the anophelines was examined in natural growths and in bromeliads placed on platforms in an Immortelle tree at different heights from ground level. The results are tabulated and discussed. Neither the largest bromeliad (*Vriesia amazonica*) nor the most abundant (*Aechmea nudicaulis*) is shown to be of very great importance. But *Gravisia aquilega* stands out as decidedly the most important of twelve species present, since it alone constitutes 57 per cent. of the total potential breeding ground : below 30 feet level the figure is 76 per cent.

As a result of the analysis of the details of this quantitative survey it is possible to say that part of the bromeliad population is sufficiently unimportant to be safely ignored, with a consequent reduction in the cost of control.

H. S. Leeson

UEBEL, H. Die Nachkriegs-Malaria in Mazedonien vom pathologisch-anatomischen Standpunkt. [**Malaria in Macedonia after the War from the Pathological Aspect.**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1950, Sept., v. 2, No. 2, 239–45, 3 figs. [16 refs.]

During the war malaria was very severe in Macedonia. Since then its incidence and severity have both been very considerably reduced. In 1,250 autopsies since 1947 malaria was the primary cause of death in only four cases. Clinical and pathological details of these cases are given.

In one patient there were perivascular cellular nodes resembling early Durck granulomata, but no associated haemorrhages. No parasites are mentioned in the report on this case, but they were presumably present as the author in his discussion refers to it as being one of *P. falciparum* infection. In the second case, plasmodia (*P. falciparum*) were found in large numbers in the small vessels of the brain, the tissue of which was grey and spotted with small haemorrhages. The third case, that of an 11-year-old girl, was fatal within three days of the onset. *P. vivax* was found in thick blood films and the clinical diagnosis was " malaria tertiana comatosa." The oedematous and swollen brain showed no well-developed haemorrhages or softening either in the cortex or elsewhere. In the brain there was much pigment and degenerated plasmodia which could not be certainly identified ; there was also some occlusion of the small vessels, considerable diapedesis of red cells and " encephalitic " changes. The spleen, which was not much enlarged, contained pigment and *P. vivax*.

The fourth case was that of a child of two years in whom there was severe anaemia, oedema of the lungs, brain and subcutaneous tissues and ecchymoses beneath the pleura, pericardium and in the dura. Dividing forms of *P. vivax* were found in the spleen and liver, and in the small branches of the portal vein there was subendothelial accumulation of malaria pigment, with endothelial degeneration and the beginning of thrombosis evidenced by a fine net of fibrin with entangled erythrocytes. [An unconvincing photograph is provided to illustrate this point.]

The author discusses the four acute fatal cases, and another in which there was a mixed infection with *Leishmania donovani* and *P. vivax*.

The two patients with *falciparum* malaria (one aged 56, the other 72 years) showed features clinically cerebral in type. The spleen was small in both ; the brain lesions in the first case, in which there were no haemorrhages and no obvious gross disturbance of circulation, suggest to the author the acute action of some toxic substance. [To the reviewer the description reads more like stasis.] The fatal *vivax* cases are interesting because of their rarity. There is a discussion on the possible mechanisms involved in death from *vivax* infection, in which there is nothing beyond the usual suggestions of toxins, thrombosis, embolism and endothelial damage. The author regards such infections as " *akute*,

hypertoxische Malaria tertiana". The co-existence of an overlooked *falciparum* infection is not considered.

Fourteen patients examined since 1947 were thought to have chronic malaria. One, a child of 1½ years, was proved to have kala azar, *P. vivax* and malaria pigment being found at autopsy. The author discusses the relation between the appearance of the kala azar and the malaria infection in the light of CORKILL's suggestion that latent leishmaniasis may be activated by malaria [this *Bulletin*, 1949, v. 46, 22].

Five per cent. of cases examined had malarial pigment in the spleen, usually in the interfollicular portions of the red pulp. This represents a great reduction in the proportion of autopsies revealing present or past malaria infection. Pigment was present more frequently in young people and those between 40 and 60 years. *B. G. Maegraith*

WEWALKA, F. Zur Frage der "blauen Pigmentmakrophagen" im Sternalpunktat. [**The Question of the "Blue Pigmented Macrophages" in Sternal Puncture.**] *Wien. klin. Woch.* 1950, Oct. 20, v. 62, No. 42, 788–91, 2 figs. [12 refs.]

In a biopsy of splenic pulp removed from an undiagnosed case of splenomegaly, MOESCHLIN (*Die Milzpunktion*, 1947 : Basel : B. Swabe and Co.) recorded the discovery of reticulum cells which were filled with fine granules of some substance which took on a deep blue colour with May-Grünwald stain. He called these cells, which he failed to find in either the sternal marrow or lymph glands, "blue pigmented macrophages". The author of the present paper records the finding of similar cells in the sternal marrow of a 27-year-old patient suffering from fever due to undiagnosed cause, severe vitamin A deficiency, and some obscure retinal pigmentation. After studying the histochemical reactions of the cells, he concludes that the granules may in some way be related to the presence of malaria infection, and might possibly be, as Moeschlin suggested, an iron-free blood pigment. There was some evidence of malaria infection in the author's case and in both the original case described by Moeschlin and another case investigated by him and mentioned in this paper. On the other hand, the author points out that there is no record in the literature of these blue-staining cells in spleen or bone marrow biopsies or autopsies in malaria. The true nature of the pigment is unknown. There is no free iron present.

B. G. Maegraith

FUHRMANN, G. & KNÜTTGEN, H. Serumeisenbefunde bei Malaria tertiana. [**Serum Iron Values in Benign Tertian Malaria.**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1950, Apr., v. 1, No. 4, 515–26, 5 figs. [17 refs.]

The content of iron in serum has been investigated in 159 patients with benign tertian malaria to see if it corresponded with that present in haemolytic anaemia. In normal cases the amount of iron in serum is controlled chiefly by absorption from the alimentary tract, and may be greatly altered in amount during the course of disease. It appears to be bound to protein and can be separated into several fractions by chemical methods. The iron which can be split off by HCl appears to be biologically the most significant. The method of estimation used depended on the red colour produced by trivalent iron in the presence of sulphosalicylic acid, which is changed to yellow on being made alkaline with ammonia. Two ml. of serum obtained by venepuncture was mixed with 1 ml. of 2·5 N HCl and deproteinized with trichloracetic acid. The sulphosalicylic acid was then added and followed by ammonia to make alkaline. The extinction was measured in a photometer with a cell 5 cm. thick and a

blank value was obtained in the same way, with water instead of serum. The sensitivity of the method was approximately 5 γ per cent. and required the use of scrupulously clean glassware. The first single determinations of iron were made without reference to the onset of the malarial attack and it was found that there was a wide scatter in the values.

When repeated determinations were made during the course of the attack the values were highest at the start of fever associated with sporulation and haemolysis and fell as the fever abated to values below normal. In induced fever it has been noted that the serum iron values fall, and iron is thought to be taken up by the cells of the reticulo-endothelial system. The high level of iron in serum at the start of the rigor was a constant finding and was probably due to the entry into the blood of the products of its destruction in agreement with the observed haematinaemia. It was concluded that the anaemia occurring in malaria is not due simply to the destruction of red blood cells but that a large number of other factors play a part, including interference with iron metabolism. *J. D. Fulton*

OVERMAN, R. R., HILL, T. S. & WONG, Y. T. **Physiological Studies in the Human Malarial Host. II. Blood, Plasma, " Extracellular " Fluid Volumes and Ionic Balance during Convalescence from Therapeutic** *P. vivax* **and** *P. falciparum* **Infections.** *J. National Malaria Soc.* 1950, Sept., v. 9, No. 3, 205–13, 7 figs. [13 refs.]

This paper is the successor to an account of the serial measurement of various physiological factors in therapeutic *vivax* and *falciparum* malaria infections, *viz.*, body weight ; plasma and " available " volumes ; Na, K and Cl concentrations of whole blood, plasma red cells and urine ; plasma protein ; haematocrit reading ; 24-hour urinary volume.

The methods used were as previously described by the authors [this *Bulletin*, 1949, v. 46, 801].

The paper records the results of observations in 44 patients made in the period which followed " termination " of the disease either by spontaneous remission or with atebrin [mepacrine], quinine, plasmoquine, paludrine [proguanil] or chloroquine. [It is difficult from the text to understand what the authors mean by " termination ", since they have divided their observations into three groups, *i.e.* (1) those made " on the first to seventh day following termination " ; (2) " on the eighth to twenty-first day " ; (3) " between the sixtieth and three hundred and sixty-fifth days ". In the first two groups figures are given for " parasites per cu. mm.". It is not easy to see why such cases were considered to be in " convalescence ", as described in the title.]

The biochemical and physiological changes observed during the malarial attacks were found to return to normal in convalescence, but not all at the same time. The increased " available fluid " volume (thiocyanate space), the increased erythrocyte Na and decreased K became normal by the third week of convalescence. The authors regard these changes as evidence of altered cell permeability. The ionic concentrations of whole blood, the plasma protein concentrations, and the plasma volume readjusted more slowly.

The authors state that there was little significant difference between the results obtained in *vivax* and *falciparum* malaria.

[The absence in this report of information regarding the malaria infections in the individual subjects makes the work, in the abstracter's opinion, difficult to follow and interpret. There is no separation of the results obtained in the *vivax* and the *falciparum* cases. The points in the graphs represent " an average of from 17 to 50 cases " which are unspecified. (The results, incidentally, are stated to have been obtained from only 44 patients.) No information whatever

is given about individual treatment ; the physiological effects of the wide variety of antimalarials mentioned are apparently not considered.]

B. G. Maegraith

RIGDON, R. H. **A Consideration of the Phenomenon of "Sludged Blood" in Disease.** *Amer. J. Clin. Path.* 1950, Oct., v. 20, No. 10, 946–51. [14 refs.]

The author calls for a re-examination of the concept of "sludged" blood in disease in the light of recent criticism and discussion.

He points out that in the pathological conditions in which sludging occurs [KNISELY, STRATMAN-THOMAS and ELIOT, *Anat. Rec.*, 1941, v. 79, 53, 90], Knisely's groups of red cells held together by "fibrin or a fibrin-like substance" must in effect act as emboli. Sludges of the size and number described in *P. knowlesi* malaria would be expected to occlude small vessels, but, in fact, such infarcts were not found in many of the actual monkeys on which Knisely made his original observations. Moreover, studies on the pathology of *falciparum* malaria have not demonstrated infarcts as the characteristic lesions. The brain lesions in *falciparum* malaria, for instance, include petechial haemorrhages, and the small vessels are filled and distended with erythrocytes, parasitized and unparasitized, but evidence of thrombosis is rare.

"It would appear, therefore, that the significance of the masses of cells considered as 'sludges' and formed by red cells held together by 'fibrin or a fibrin-like substance' in the blood of monkeys infected with *P. knowlesi* may be questioned on the basis of the absence of infarcts and significant hemorrhages in the viscera at the time of autopsy."

No clear demonstration has been recorded of the nature of the "glassy precipitate" surrounding the red cells described by Knisely, and this author's explanation of the action of atebrin [mepacrine] and quinine (*i.e.*, that they dissolve the "fibrin" and liberate the erythrocytes) is certainly open to question.

A total of 40 abnormal states in which sludging occurs is recorded by Knisely (KNISELY and BLOCH, *Proc. Inst. Med. Chicago*, 1945, v. 15, 281). The present author believes that the one common factor in all these conditions may be "a disproportion between the amount of plasma and the number of erythrocytes . . . in the condition now recognized as haemoconcentration". The escape of fluid from the circulating blood into the tissues is probably the result of prevailing anoxia of the endothelial cells.

[Those interested in the pathogenesis of tissue lesions in malaria will profit by reading the original article.]

B. G. Maegraith

DRUKKER, W. & DE VRIES, S. I. Entmalaria door bloedtransfusie. [**Transfer of Malaria by Blood Transfusion.**] *Nederl. Tijdschr. v. Geneesk.* 1950, Nov. 18, v. 94 (iv), No. 46, 3312–15. [10 refs.]

The English summary appended to the paper is as follows :

"Communication of two cases of malaria by inoculation, 14 and 18 days after a blood transfusion. The possibility is pointed out of the increasing risk of malaria by transfer through blood transfusion in the Netherlands also."

JUSTESEN, V. H. & KOOLSBERGEN, N. **Spontaneous Rupture of the Spleen in Malaria.** *Archivum Chirurgicum Neerlandicum.* Amsterdam. 1950, v. 2, No. 1, 91–6, 1 fig.

Very few cases of spontaneous rupture of the malarial spleen have been recorded as, in the absence of a careful pathological examination, the possibility

of a pre-existing abnormality—such as infarct or subcapsular haemorrhage—having preceded the rupture cannot be excluded. In tropical countries, where enlarged flabby malarial spleens are common, small internal injuries to the organ must occur frequently, leading to subcapsular haemorrhage ; rupture occurs later, so that many of the reported cases of spontaneous rupture are in reality of traumatic origin. The authors record a case of a man, aged 22, who had suffered from attacks of malaria in Java during the previous two years ; he had had a relapse on the day before admission, during the course of which he vomited several times. Violent pain in the left hypochondrium set in that night and he was admitted to hospital next day with signs of intraperitoneal haemorrhage. Laparotomy was performed at once, the peritoneal cavity was found to be full of blood and the spleen, which was of the size of a child's head, was torn on the diaphragmatic aspect. Splenectomy was followed by an uninterrupted convalescence. Large numbers of malaria parasites were found in smears from the spleen and sections showed much pigment, but no abnormality of the walls of the blood vessels. The immediate cause of rupture in these cases is stress in coughing, vomiting or defaecation during or after an attack of malaria, so that it can hardly be described as spontaneous : but the authors suggest that " there can be no nearer approach to ' spontaneous rupture of the spleen ' than in that of our patient." *W. L. Harnett*

MORETTI, G. F. Accès pernicieux algide et choc médical. [**Algid Malaria and Medical Shock.**] *J. Méd. de Bordeaux.* 1950, Oct., v. 127, No. 10, 676–85. [25 refs.]

This paper contains a general discussion of the nature of algid malaria, centred around two cases, details of which are given.

On the basis of observations made by the author and many others the signs and symptoms of the various clinical varieties of algid malaria are compared at length with those of medical shock, and it is concluded that pernicious algid malaria is in fact an example of medical shock appearing during a malarial attack. This conclusion leads to certain therapeutic deductions, the most important of which are the necessity to restore the circulating blood volume and the importance of immediate treatment of the malaria. Reasons are given for the contraindication of adrenaline ; the use of antihistamine agents is discussed.

[This is a paper which is well worth reading. The acceptance by the author of the importance of medical shock in malaria is encouraging. His review of the relevant literature is, however, incomplete in that it includes little of the recent English work.] *B. G. Maegraith*

THIODET, J. La pathogénie de l'accès palustre. (Rapports avec le choc anaphylactique—corrolaires thérapeutiques.) [**Pathogenesis of the Malaria Attack : its Relation to Anaphylactic Shock—Therapeutic Implications.**] *Algérie Méd.* 1949, May, No. 5, 149–56.

The author details the close analogies that exist between the symptoms and signs of the acute attack of malaria and anaphylactic shock—rigor, fever, sweating, dyspnoea, intense headache, muscular pains, changes in differential blood count, blood coagulation, arterial tension and modification in blood proteins. If the malaria attack be indeed an anaphylactic phenomenon it should be possible to alleviate the symptoms by desensitizing the patient. This the author has endeavoured to do by intradermal injection of specific CO_2 globulin. This is obtained by bubbling CO_2 through serum, obtained from a malaria patient, previously diluted with distilled water. Nine of

ten patients treated in this way reacted in a remarkable way. The fever was suppressed though the treatment had no influence on the parasitaemia. The general condition of the patient showed noteworthy improvement. The symptoms of shock are responsible for the gravity of pernicious attacks. The desensitizing treatment should, therefore, have precedence of, or at least be simultaneous with, the administration of specific antimalarial drugs. [See also this *Bulletin*, 1950, v. 47, 1170.] *Norman White*

WINCKEL, C. W. F. **Comments on the Report of the Third Session of the Expert Committee on Malaria of the World Health Organization held at Geneva, August 10th to 17th, 1949.** *Documenta Neerlandica et Indonesica de Morbis Tropicis.* Amsterdam. 1950, Sept., v. 2, No. 3, 209–24. [12 refs.]

In this paper the author makes a spirited attack on that portion of the Report of the Third Session of the Expert Committee on Malaria, WHO, that deals with malaria therapeutics [this *Bulletin*, 1951, v. 48, 2]. More especially he resents the references to quinine which " pass an unfavourable judgement " on it. He regards the Committee's remarks regarding the toxicity of quinine as being based on insufficient evidence. At the same time he considers that the limitations and disadvantages of the synthetic remedies receive less than their due meed of attention. Too little is made of the danger of psychic disturbances, cutaneous reactions and blood changes which may result from the use of mepacrine. In support of this contention the findings of no less than 76 contributions to the literature are summarized in three appendices. Similarly the author considers that the claims made for proguanil and chloroquine are exaggerated ; 31 references to literature illustrate the limitations of proguanil. The author sums up his criticism as follows : " the part of the present report of the Expert Committee on malaria which deals with malaria therapeutics cannot sustain comparison with the well documented reports of the Malaria Commission of the former League of Nations, especially those published in 1933 and 1937 and which held, and fully merited, the attention of all tropical clinicians. I hope my criticism will lead to discussion and that it may contribute to a more balanced evaluation of the different antimalarial drugs." *Norman White*

SOKAL, J. E. **Treatment of Intolerance to Quinacrine.** *U.S. Armed Forces Med. J.* 1950, Oct., v. 1, No. 10, 1167–70.

Quinacrine [mepacrine] in doses of 0·1 gm. daily was well tolerated by most troops in malarious districts, although a small percentage had symptoms, usually gastro-intestinal, when treatment was begun. Tolerance was usually quickly established, but a much smaller number of men experienced severe symptoms which became intensified with further doses and treatment with the drug had to be stopped.

This report deals with observations on an infantry battalion of seasoned United States troops who had previously spent 2 years in a non-malarious area. When they were ordered to the South Pacific prophylactic treatment with 0·1 gm. of quinacrine daily was commenced. Only a few men reported symptoms of nausea, vomiting, abdominal cramp and diarrhoea. The drug was continued, a few men were given tinct. belladonnae or paregoric and, with the exception of two cases, there were no further complaints. In these two cases prophylactic treatment against possible intolerance was begun before further administration of quinacrine was attempted.

In the first case abdominal discomfort was complained of on the first day; on the second day nausea and diarrhoea occurred; on the third the diarrhoea became very severe and the men vomited. Attempted desensitization with fractional doses of quinacrine was unsuccessful and the drug had to be discontinued owing to repeated vomiting.

Later a final attempt was made. Four cc. of paregoric and 15 drops [*sic*] of tinct. belladonnae were given 4 times daily for two days and on the third day one-quarter tablet of quinacrine and 0·1 gm. of phenobarbitone in addition. Some abdominal discomfort was experienced so the belladonna and paregoric were continued together with two doses of 0·03 gm. of phenobarbitone. On the following day one-quarter tablet of quinacrine was given, the other medication being continued. On the fifth day the amount of phenobarbitone was reduced, only 2 doses and half a tablet of quinacrine were given. On the sixth day sedative treatment was stopped, paregoric and belladonna were contined and half a tablet of quinacrine was given and repeated on the seventh. On the eighth day 1 tablet of quinacrine and one dose of belladonna and paregoric were given. All auxiliary medication was then stopped and the patient took one tablet of quinacrine daily without signs of intolerance.

A few hours after his first dose of quinacrine the man in the second case recorded suffered from nausea, vomiting, diarrhoea, and abdominal cramp. This occurred after a party where a large amount of whisky had been consumed, and the true cause of the symptoms was not realized. Two days later another tablet of quinacrine was given and the symptoms recurred with increased violence, and the drug was stopped. Three weeks later 4 cc. of paregoric and 15 drops of tinct. belladonnae were given every 4 hours (for 4 doses) and after the 4th dose one quarter tablet of quinacrine was given. Slight symptoms occurred early the next day so 0·1 gm. of seconal was given, and half a tablet of quinacrine at midnight after administration of paregoric and belladonna. There were no ill effects. On the third day one motion sickness preventive capsule (M.S.P.) was given every 4 hours, and half a tablet of quinacrine was taken without ill effects. On the fourth and fifth days M.S.P. capsules and one tablet of quinacrine were given. On the sixth day all auxiliary treatment was stopped and daily doses of quinacrine given without signs of intolerance.

In a third case a ship's officer also complained of severe nausea and moderate vomiting after quinacrine, and two attempts to give the drug had to be abandoned. Later M.S.P. capsules were given every 4 hours for the first day, and a quarter tablet of quinacrine on the second, the dose of this drug being gradually increased. At the end of a week this officer was successfully taking 0·1 gram. of quinacrine daily without any other treatment.

The cause of quinacrine intolerance is unknown; it does not appear to be an allergic reaction, and in many cases a psychological influence has been implicated. It is generally agreed that, with few exceptions, if a man can be persuaded to take the drug regularly for a short time, intolerance disappears. The author suggests that the technique used may be generally applicable in the case of other drugs. *C. F. Shelton*

MALAYA, FEDERATION OF: MALARIA ADVISORY BOARD. Circular No. 5. **Proguanil (Paludrine).** 1950, July, 6 pp.

By question and answer this useful circular imparts to the doctor working in Malaya the latest information on the value and limitations of the antimalarial drug, proguanil. It is quoted as having the special merits of being a true prophylactic of *P. falciparum* malaria, the only non-toxic gametocidal drug for *P. falciparum* infections and of having low toxicity. As there is evidence of the

production of proguanil-resistant strains of *P. falciparum* in Malaya (but so far not of *P. vivax* or *P. malariae*) it is possible that its usefulness as a prophylactic may be impaired. The following measures are suggested in an endeavour to prevent or delay the emergence of resistant strains :—

(*a*) Strict supervision to ensure *regular* prophylactic dosage.
(*b*) All cases of acute malaria arising in populations protected by proguanil should be treated with some other drugs such as chloroquine, mepacrine or quinine.
(*c*) Prophylactic proguanil might be alternated with prophylaxis by another drug.
(*d*) Populations protected by proguanil might be given a therapeutic course of chloroquine or mepacrine once every 6 months. This "blanket" treatment would probably destroy the potentially resistant blood forms.

Details of clinical treatment and prophylactic dosage are provided. Briefly the prophylactic dose for non-immunes is 1 tablet (0·1 gm.) daily, and for semi-immunes 1 tablet twice a week, taken all the year round as a general rule. Despite drug resistance it may be expected fairly that very good results on the whole will accrue from the use of prophylactic proguanil in Malaya.

[A well-balanced explanation of the value of proguanil relative to mepacrine and quinine for clinical and prophylactic purposes.] *R. Ford Tredre*

LOZANO MORALES, A. Paludismo y Nivaquina-B (Cloroquina). Estudio clínico, parasitológico y epidemiológico. [**Malaria and Nivaquine B. Clinical, Parasitological and Epidemiological Study.**] *Rev. de Sanidad e Hig. Pública.* Madrid. 1949, Sept., v. 23, No. 9, 705–12. [15 refs.]

The author reports favourably on the treatment of 37 patients suffering from malaria (36 *P. vivax* and 1 *P. falciparum*) with nivaquine B (chloroquine). The sulphate was used in tablet form, each tablet containing 0·1 gm. of base. The first 15 patients were each given a total dose of 2·1 gm. over periods of 6 or 7 days. The last 21 patients each received 1·8 gm. in three days, 0·9 the first day, 0·6 the second and 0·3 gm. the third day, three divided doses each day after food. Parasites disappeared from the blood of all these 21 patients in 24 to 36 hours. (In one *P. malariae* infection schizonts persisted from 48 to 60 hours.) The action on the fever was equally prompt. There was no sign of drug intolerance in any case. A further compression of the duration of treatment from 3 to 2 days (total dose 1·8 gm.) was being tried. *Norman White*

SCOTT, V. **Single Intravenous Injections of Chloroquine in the Treatment of Falciparum Malaria : Toxic and Immediate Therapeutic Effects in 110 Cases.** *Amer. J. Trop. Med.* 1950, July, v. 30, No. 4, 503–10.

These observations were made in Honduras. Twenty-five patients with untreated *P. falciparum* malaria were treated intravenously with chloroquine diluted with normal saline solution. None of them had had clinical malaria during the year preceding the present attack and none of them had received suppressive therapy. Immediately before the injection a parasite count was made and the temperature, pulse rate and blood pressure were recorded. The drug used was aralen dihydrochloride in 10 ml. ampoules, each ampoule containing 400 mgm. of base. The contents of one ampoule were diluted with 40 ml. of sterile physiological saline solution and the mixture aspirated into a 50 ml. syringe. The intravenous injection was made slowly (average time 15 minutes) with frequent pauses for recording the pulse rate and for questioning the patient about subjective reactions. After the injection the blood pressure

was checked repeatedly during 15 minutes to one hour. The temperature was recorded hourly till it had fallen to 37·5°C. No further antimalarial treatment was given during the patient's stay in hospital. Honduranians are of small stature : the smallest dose given was 5·8 mgm. chloroquine base per kgm. of body weight, the largest 12·5 mgm. per kgm., and the mean 7·6 mgm.

The most common subjective symptoms complained of by the patients were dizziness (18) and drowsiness (13). Three patients complained of nausea ; two of them vomited. These three patients had temperatures of 40·0°C. or over. Objectively the most consistent effect was a fall in systolic blood pressure of 2 to 46 mm. Hg, average 20 mm. Hg. This is apparently due to a direct vasodilating action of the drug. Usually the depression of systolic blood pressure was of short duration, 10 to 30 minutes. There were no alarming concurrent phenomena. The temperature fell to normal in 2 to 22 hours (average 12). The average time for the disappearance of the trophozoites from the blood was 46 hours (7 to 72).

Ten other patients each received the contents of one ampoule undiluted : the intravenous injection of this took 3 minutes. The subjective symptoms were of the same nature but somewhat more marked than in the previous group. The fall in systolic blood pressure was as much as 54 mm. Hg in one patient (average 26 mm.). The diastolic pressure was unchanged in 4 patients but the average fall for the group as a whole was 9 mm. Hg. There were no serious or alarming symptoms in any of the ten patients. The therapeutic response to the treatment closely resembled that of the previous group.

Seventy-five patients were treated by intravenous infusion of chloroquine. One ampoule of aralen dihydrochloride in 500 ml. of sterile physiological saline was injected by intravenous drip, the duration of the infusion approximating one hour. In patients treated in this manner the mean decrease in systolic blood pressure was only 8 mm. Hg ; diastolic 2 mm. Hg. Subjective reactions were almost completely absent. The therapeutic effects were as satisfactory as those obtained with more concentrated solutions. *Norman White*

COATNEY, G. R., COOPER, W. C., EYLES, D. E., CULWELL, W. B., WHITE, W. C. & LINTS, H. A. **Studies in Human Malaria. XXVII. Observations on the use of Pentaquine in the Prevention and Treatment of Chesson Strain *vivax* Malaria.** *J. National Malaria Soc.* 1950, Sept., v. 9, No. 3, 222–33, 1 fig. [10 refs.]

Five volunteers were given 60 mgm. pentaquine (base) and 2 gm. quinine (base) per day, in divided doses, one day before, the day of and for six days after being bitten by *A. quadrimaculatus* infected with the Chesson strain of *P. vivax*. Five men were given the same doses of quinine without pentaquine, and there were four untreated controls. One of the pentaquine volunteers had a severe haemolytic reaction after the first dose on the fourth day of administration ; pentaquine was discontinued in his case. All the men experienced attacks of malaria. In the four men who received full doses of pentaquine and quinine, patent parasitaemia appeared 15, 19, 21 and 21 days after exposure ; in all other volunteers 11 to 12 days after exposure. The attacks in those who had pentaquine were more easily cured than those in the controls.

Twenty-three volunteers were employed to determine whether cinchonidine or cinchonine were as effective as quinine, in association with pentaquine, in the prevention of relapse. Neither pentaquine-cinchonidine nor pentaquine-cinchonine prevented relapses as well as did pentaquine-quinine, but men so treated had fewer and more widely-spaced relapses than those treated with quinine alone.

It was observed that patients infected with different lots of mosquitoes, with comparable numbers of sporozoites, appeared to differ in their potential to relapse. In some series 60 mgm. pentaquine with 2 gm. quinine were curative ; in other series this treatment failed.

During 112 courses of treatment with pentaquine alone or in different combinations many toxic reactions were noted in addition to anorexia, nausea, abdominal discomfort and cyanosis. Drug fever occurred in 16 men, being most noticeable on the 6th to 8th day of the first course of treatment. Repetition of pentaquine treatment in these men was uneventful. In 15 men haemoglobin concentration fell 10 per cent. or more during the course of therapy. In 2 men haemoglobin reduction necessitated the cessation of treatment : one of these, a white man, had a severe acute intravascular haemolysis. *Norman White*

RUGE, H. Die Malaria am westlichen Schwarzen Meer und ihre Beeinflussung durch Schutzbehandlung mit Atebrin. [**Malaria in the Western Area of the Black Sea Coast and the Suppressive Effect of Atebrin (Mepacrine).**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1950, July, v. 2, No. 1, 83–94, 3 figs. [23 refs.]

German troops were stationed on the west coast of the Black Sea from 1941–43. They arrived towards the end of a severe malaria epidemic (controlled by quinine and pamaquin) among the indigenous population, and were placed on suppressive therapy with atebrin [mepacrine] (troops and air force on 60 mgm. daily ; marines on 200 mgm. twice weekly) during the infective season, May to October. The results of the suppressive therapy were estimated by blood examination and spleen palpation ; local inhabitants and army units not on atebrin acted as controls.

In 7,233 persons on atebrin therapy the parasite index varied from 5·6 to 87·6 per 1,000. Only a small fraction (5·5 per 1,000) of the troops harbouring parasites were infective to mosquitoes. The spleen index in troops on atebrin was practically zero.

Daily dosage of 60 mgm. atebrin was found to be more effective than the twice-weekly dosage. Deficient or irregular dosage with atebrin was considerably active. Very few men showed incompatibility to the drug ; these were given Chinoplasmin. In 1942 and 1943 the suppressive course was followed by a therapeutic dosage of 100 mgm. atebrin three times in the day for seven days.

The action of atebrin was most notable on *falciparum* malaria. After 1942 very few cases of this infection were reported. *B. G. Maegraith*

HIMPE, N. E. & PIERQUIN, L. Essai de prophylaxie antipaludique par l'Aralen et la Paludrine en milieu rural. [**Trial of Aralen and Paludrine as Malarial Prophylactics in a Rural Community.**] *Ann. Soc. Belge de Méd. Trop.* 1950, June 30, v. 30, No. 2, 217–46, 2 graphs.

These observations were made in the village of Kingashi, 8 miles south of Popokabaka, on the right bank of the Kwango near the junction with its tributary the Luwaye. Its inhabitants are Bayakas, malnourished, primitive people. Malaria endemicity is permanent. The population was divided into three comparable groups, about 80 in each. The first group received aralen [chloroquine], the second paludrine [proguanil], the third were untreated controls. The drugs were given once a week in tablet form. The adult doses were : aralen diphosphate 0·5 gm. ; paludrine 0·3 gm. The controls each received a salol tablet. The medication was continued for 17 weeks, from the end of one rainy season to the onset of the next. Thick and thin blood smears were taken before drug administration and after the 5th, 11th and 17th weeks of medication.

The parasite rates of the three groups before treatment were 66·1, 73·1 and 60 per cent. respectively. *P. falciparum* was the predominant species; *P. malariae* was found in association with *P. falciparum* in many cases; *P. vivax* was not found.

After a certain time malaria could be practically eliminated by the administration of either of the two drugs, but aralen was more effective and more rapid in action than paludrine. In the aralen group, only 4 harboured *P. falciparum* gametocytes on the second examination; no parasites at all were found in the two subsequent examinations. In the paludrine group, 9 *P. falciparum* gametocyte carriers were found on the second examination; one case with trophozoites and gametocytes on the third examination, and one gametocyte carrier on the fourth. The parasite rate of the control group at the last examination was 63 per cent. Both drugs were equally effective in securing a diminution of the spleen rate and in the size of the enlarged spleen. At the end of the experiment only a quarter of the treated groups had splenic enlargement compared with a half of the control group. *Norman White*

BERNET, J. L'utilisation du D.D.T. en solution alcoolique dans la recherche des larves d'anophèles. [**Use of DDT in Alcoholic Solution in searching for Anopheline Larvae.**] *Bull. Méd. de l'Afrique Occidentale Française.* 1949, v. 6, No. 2, 167–8.

The following is a translation of the author's summary :—

Alcohol-DDT, besides its larvicidal qualities, is the best product for use in the search for anopheline larvae. It can be used in all breeding places and especially in those which are most difficult to inspect. Its mode of action is such that all the anopheline fauna of a breeding place may be seen, which allows a decision to be made with certainty as to the absence or presence of anophelines in the breeding places thus inspected. *H. J. O'D. Burke-Gaffney*

RAO, V. V. **A Critical Review of Malaria Control Measures in India.** *Indian J. Malariology.* 1949, Dec., v. 3, No. 4, 313–26. [55 refs.]

The author passes in review the malaria control measures that have been tried out in India—antilarval measures, oiling, paris green, naturalistic measures, species sanitation, etc., and pyrethrum spraying of adult mosquitoes. The successes achieved by such measures and their limitations are briefly described. Then follows a long dissertation on DDT spraying, together with much information about the chief vector species of *Anopheles* in India. Stress is laid on the gaps in our knowledge of the bionomics of such species. The paper covers a much wider field than its title suggests. It is well written and informative but too discursive for summary. Its final sentence begins: "If this paper dispels, even to some extent, the popular notion that, after the advent of DDT, malaria research has become a luxury and all that needs to be done is only periodical spraying of DDT on the walls its purpose is served. . . ." *Norman White*

SUBRAMANIAN, R., VAID, B. K. & DIXIT, D. T. **Kaknar Nyay Panchayat Malaria Control Co-operative Scheme.** *Indian J. Malariology.* 1949, Dec., v. 3, No. 4, 339–48, 1 map & 1 graph.

The area in which this cooperative malaria control scheme was undertaken forms the southern portion of Nimar District, Central Provinces and Berar. It lies between two spurs of the Western Satpura Mountain Range which are

well wooded and give rise to numerous streams flowing to the Tapti River which traverses the area. Malaria was hyperendemic. There are 34 villages situated along sixteen miles of the Burhanpur-Dharni road with Kaknar in the centre. The aggregate population is 15,000. The aboriginal population live in bamboo huts with thatched roofs ; settlers from the plains live in small houses with mud-plastered walls and thatch or tile roofs.

The anopheline fauna includes *Anopheles subpictus*, *A. culicifacies*, *A. stephensi*, *A. fluviatilis*, *A. vagus* and *A. theobaldi*. Both *A. culicifacies* and *A. fluviatilis* have been incriminated as vectors ; the latter is relatively scarce. The transmission season is from September to February : infected *A. culicifacies* have also been captured in July and August.

All dwellings and animal houses were sprayed with DDT three times between July and December 1948. The results were satisfactory. The infant parasite rate in January 1949 was in Kaknar 7·8 as compared with 40 per cent. in a comparable unsprayed village. The number of cases of malaria treated in the dispensary in 1948 showed a reduction to nearly one-third of the figures for the three previous years. The freedom from mosquitoes and other ectoparasites that the people enjoyed made the measure popular : the villagers claimed also that their cattle had improved in health and the milk yield of cows had increased. Neighbouring areas have applied for inclusion in the scheme. The Government supplied free of cost DDT, spraying equipment and technical supervision ; the villagers supplied the labour. The cost per head *per annum* was 7·4 annas, of which the Government contribution was 5·8 annas. *Norman White*

VISWANATHAN, D. K. & RAO, T. R. **Control of Rural Malaria with D.D.T. Indoor Residual Spraying in Kanara and Dharwar Districts, Bombay State : Third Year's Results, 1948–49.** *Indian J. Malariology.* 1949, Dec., v. 3, No. 4, 269–312.

Judged by the reduction of the numbers of the vector species in sprayed dwellings, the DDT indoor residual spraying continued to be as effective in the third year of this work as in the previous two years [this *Bulletin*, 1949, v. 46, 16 ; 1950, v. 47, 1062].

Detailed tables show that cumulative spleen rates have further declined to 7·1 per cent. in Kanara and to 7·7 per cent. in Dharwar from 11·6 per cent. and 10·6 per cent. respectively in the previous year. In the unsprayed areas they are 52·9 and 18·0 per cent. respectively as compared with 47·1 and 25·1 per cent. in the previous year. Infant parasite rates have fallen to almost nil in the sprayed areas. Dispensary statistics reveal a continued decline in cases of malaria, estimated at 360,000 decrease during the third year. Mean death rates have fallen by 10 per mille in Kanara and 8 per mille in Dharwar, and birth rates risen by 3·6 and 2·2 per mille respectively. Kanara district zoologically speaking is surrounded by tracts in which there is extreme scarcity if not absence of *A. fluviatilis*, the highly efficient vector ; continuation of the spraying programme may therefore reduce the vector population to vanishing point throughout Kanara. The expected cost of continuing the programme is six annas per head per annum. Public co-operation persists and there are few critics and these usually associated with culicine nuisance. Three rounds per year of DDT application are to be continued. No cases of plague have been reported in the sprayed villages and the fall in deaths from diarrhoea and dysentery is maintained in Dharwar, where cattlesheds are included in the spraying programme. *R. Ford Tredre*

VEDAMANIKKAM, J. C. **Incidence of *Anopheles fluviatilis* James Larvae in a D.D.T. Sprayed Area in Wynaad, South India.** *Indian J. Malariology.* 1949, Dec., v. 3, No. 4, 331–8, 1 map & 2 charts.

Anopheles fluviatilis, the carrier of malaria in Wynaad, South India, breeds in the main streams and contour drains of the valleys and rests in houses. Adult mosquitoes are most prevalent during April to June, which is also the peak of the malaria transmission season. During 1945–1946 only antilarval measures were taken, such as flushing of streams. Pyrethrum sprays were used against the adult mosquitoes in 1946–47 but these were gradually replaced by DDT. In 1947 the inside walls of houses were sprayed with a 5 per cent. DDT solution in kerosene giving a deposit of 100 mgm. DDT /sq. ft. This was replaced in 1947–1948 by the use of a 5 per cent. DDT M.K.E. soap emulsion used at the rate of 50 mgm. /sq. ft. with an interval of six weeks between sprayings.

The density of *A. fluviatilis* adults showed a considerable drop after spraying with DDT, as shown below.

Year	Density (number caught per 100 houses in 24 hours)	
	Unsprayed area	Area sprayed with DDT
1947	88·1	1·53
1948	19·9	0·05

There was also a marked reduction in the number of larvae found in the breeding places after indoor spraying with DDT. *C. M. Harrison*

MALAYA, FEDERATION OF : **Annual Report of the Malaria Advisory Board for the Year 1949** [MACGREGOR, R. B., Chairman]. 7 pp., 6 charts & 1 coloured map. 1950. Kuala Lumpur : Govt. Press. [60 cents or 1*s.* 5*d.*]

The 14,663 cases of malaria admitted to hospitals in Malaya in 1949 were 66 per cent. of the total for 1947. The case mortality in 1949 was 2·1 per cent. Blackwater fever occurred in 6 cases. Rather disappointing results were obtained on one rubber estate where antilarval oiling was replaced by DDT house-spraying as the sole measure of control of the vector mosquito, *A. maculatus.* The continued low incidence of malaria and the lack of certainty of the relative merits of control measures influences the actual methods in use on estates. Of 80 estates in Selangor, 17 rely on oiling alone ; 14 on oiling plus DDT house-spraying ; 16 on oiling plus paludrine [proguanil] ; 9 on oiling, DDT and paludrine ; 8 on paludrine only ; 12 on DDT and paludrine ; and 2 on DDT only. *R. Ford Tredre*

BONNE-WEPSTER, J. & SWELLENGREBEL, N. H. *Anopheles sundaicus* **and DDT-Spraying.** *Documenta Neerlandica et Indonesica de Morbis Tropicis.* Amsterdam. 1950, June, v. 2, No. 2, 154–60, 3 graphs.

The north coast of Java is a good breeding area of a most important malaria vector, *Anopheles sundaicus*, and also of *A. subpictus.* There were two population peaks of *Anopheles* in untreated houses between October 1947 and April 1948. The small numbers found between the two population peaks coincided with accidental DDT spraying of the area from aircraft. During October and November the population was composed almost entirely of *A. sundaicus*, whereas in February and March 96 per cent. of the *Anopheles* found were *A. subpictus.*

DDT sprayed at the rate of 68–125 ml./sq. metre of a 5 per cent. solution, on inner surface walls, roof and tiles, gave an adequate control of mosquitoes for five months.

Treatment of one house with gamma BHC (liquid concentrate LG. 140, containing 10 per cent. gamma BHC diluted with 30 times its volume of kerosene) applied at the rate of 64 ml./sq. metre controlled *Anopheles* for twenty-two days only. *C. M. Harrison*

GARTRELL, F. E. & JOHNSON, A. H. **A Study to evaluate Malaria Control Projects of Kentucky Reservoir in Terms of Collateral Uses and Socio-Economic Benefits.** *J. National Malaria Soc.* 1950, Sept., v. 9, No. 3, 259–67.

The Kentucky Reservoir is the lowest and largest of the main river reservoirs constructed by the Tennessee Valley Authority. The dam backs water up to a distance of 184 miles. The lake has an area of 158,300 acres and a shoreline of 2,380 miles. The measures taken for malaria control are briefly outlined in this paper. These measures have conferred benefits over and above those arising directly from the control of disease. The authors' summary of their paper is as follows :—

"During the preimpoundage studies of Kentucky Reservoir, it was evident that, due to its size, flat topography, and certain limitations on water level management, the conventional malaria control measures would not suffice. In recognition of this, limited areas were specially treated with diking and dewatering, deepening and filling, and land-use restriction. Although these projects were constructed primarily for malaria control, they have had numerous collateral uses, such as crop production, wildlife development, and the enhancement of recreational values. Furthermore, the full development of these areas will increase their worth. For instance, the fill areas of the deepening and filling projects may be made quite productive by reforestation, and some of the diking and dewatering projects can be made more desirable from a wildlife standpoint.

"Currently, the diking and dewatering projects are producing the most benefits because their collateral uses are more diversified. A dollar value can be placed on some of these benefits, but there are other intangibles on which a value would be difficult to estimate. Crops harvested by the farmers on eight such projects had an estimated value of $72,000, that left for wildlife was estimated at $41,000, and TVA received cash rentals amounting to $6,500 in 1948. The forestry benefits, beginning at maturity of the present timber growth, approximately twenty years hence, would have an estimated annual value of $78,500 to the timber operators and employees, and a stumpage value to TVA of $23,500 annually.

"Other malaria control features and facilities, such as marginal drainage projects, malaria control grazing projects, and malaria control bases, have contributed substantially to the economy of the region. However, some of the benefits are intangible ; therefore, no estimate of their worth is presented. On the other hand, there are real values that can be realized from the fill areas of the deepening and filling projects if put to use." *Norman White*

GALLIARD, H. & LAPIERRE, J. Recherches sur le développement initial de *Plasmodium berghei*. [**Studies on the Early Development of** *Plasmodium berghei*.] *Bull. Soc. Path. Exot.* 1950, v. 43, Nos. 7/8, 410–12.

SCHNEIDER & SCHNEIDER [see this *Bulletin*, 1950, v. 47, 1182] demonstrated that *Plasmodium berghei* could be found in the blood stream as early as one

hour after intraperitoneal injection into mice. The present authors confirmed this observation and showed that in two mice the parasites were much more numerous in serum obtained by scarifying the skin than in the peripheral blood. This concentration of parasites is a transitory phenomenon and was first noticed four hours after inoculation. There is no concentration of parasites in the blood of the spleen, liver, kidney, lung or pleural or peritoneal fluids ; they are, however, more numerous in the heart blood. All these early parasites in the skin or elsewhere were invariably in erythrocytes, and no reticulo-endothelial development of the parasite was observed. The authors suggest that their failure to find the exo-erythrocytic forms of VAN DEN BERGHE, VINCKE and CHARDOME [this *Bulletin*, 1950, v. 47, 816] may be because they were employing a different strain of *P. berghei*, but conclude that the full cycle will be elucidated only after natural, instead of blood infections.

P. C. C. Garnham

HILL, J. **The Schizonticidal Effect of some Antimalarials against** *Plasmodium berghei*. *Ann. Trop. Med. & Parasit.* 1950, Oct., v. 44, No. 3, 291–7, 2 figs. [10 refs.]

The author has compared the schizonticidal activity of a number of drugs against *P. berghei* in mice, *P. gallinaceum* in chicks and *P. relictum* in canaries, after inoculation with infected blood. [For earlier results of a similar nature see this *Bulletin*, 1950, v. 47, 324, 325.] All drugs were given orally to mice, once daily from the day of infection for 3 days and twice on the 4th day, and approximately the same technique was used with *P. gallinaceum*, while the Roehl technique was used with canaries. Stained films of blood were examined after treatment to determine the dose of drug which caused a reduction in parasitaemia compared with controls (minimum effective dose). Because of the much greater activity of sulphonamides in mouse infections than in those of chickens, the concentration of sulphadiazine in the blood of both hosts was determined after dosage of each with 100 mgm. per kgm. of sulphadiazine. The level in mice was about twice as high as that in chickens, but the author believes that the specific action of the drug on the mouse parasite was as important as the high level of drug obtaining in the host blood in bringing about a reduction in parasitaemia. Apart from the sulphonamides, *P. berghei* was less responsive to recognized antimalarials than were avian parasites. *P*-aminobenzoic acid was a more effective inhibitor of the action of sulphonamides in *P. gallinaceum* infections than in *P. berghei* infections. The greatest disparity in activity against the avian and mammalian parasites was noted with 8-amino-quinoline derivatives, proguanil and sulphonamides but close comparison was made difficult by the different rates of absorption of the drugs in the two species of host.

J. D. Fulton

TRAGER, W. **Studies on the Extracellular Cultivation of an Intracellular Parasite (Avian Malaria). I. Development of the Organisms in Erythrocyte Extracts, and the Favoring Effect of Adenosinetriphosphate.** *J. Exper. Med.* 1950, Oct. 1, v. 92, No. 4, 349–66, 1 text fig. & 15 figs. on 4 pls. [23 refs.]

The value of previous investigations on the physiology of malaria parasites was limited by the fact that they were made on organisms living within the red blood corpuscles of their hosts. A new approach to the study of the nutrition and behaviour of these parasites is described by the author, who succeeded in cultivating *Plasmodium lophurae* outside the erythrocytes. Blood from infected ducklings was suspended in a nutrient medium containing a

concentrated extract of duck erythrocytes. In this solution the parasites were freed of the host-cells by haemolysis after treatment with an anti-duck-erythrocyte rabbit serum, to which guineapig serum was added for complement. Small amounts of the suspension containing numerous free parasites were added to Erlenmeyer flasks with the nutrient medium, which was gelled by adding to it either agar, gelatin or duck plasma. The flasks, which were placed in a rocker at 39–40°C., were ventilated with a mixture of air (95 per cent.) and CO_2 (5 per cent.), and a liquid phase of the medium was added, and replaced by fresh medium at intervals of 12 hours. Under these conditions the parasites survived for 2 days and developed extracellularly, producing schizonts. These segmented to merozoites which gave rise to trophozoites. The growth of the parasites was favoured by the presence in the medium of yeast adenylic acid and cozymase, and by further addition of adenosinetriphosphate and sodium pyruvate. On the 3rd day of cultivation the parasites were still normal in appearance but later many degenerated, while very few remained normal on the 5th day. The condition of the parasites was determined by morphological criteria based on microscopical examination of samples. A description is given of the structure of *P. lophurae*, as seen in fresh preparations by phase microscopy and in stained films, illustrated by a number of photomicrographs.

The composition of the medium and of various methods used are described in great detail, for which the reader is referred to the original. *C. A. Hoare*

SCHINAZI, L. A., DRELL, W., BALL, G. H. & DUNN, M. S. **Toxicity and Effect of ω-Methylpantothenic Acid on Blood-Induced Infections of** *Plasmodium lophurae* **in the Chick.** *Proc. Soc. Exper. Biol. & Med.* 1950, Oct., v. 75, No. 1, 229–34. [17 refs.]

" ω-Methylpantothenic acid has been shown to exhibit low acute toxicity toward rats, mice and chicks. Growth inhibition of *Tetrahymena geleii* H at high levels of this analog was reversed by pantothenic acid. *Plasmodium lophurae* infections in chicks on the other hand were unaffected by ω-methylpantothenic acid administered intraperitoneally at a level of 2 g/kg twice daily for 4 days or orally at 5 g/kg daily for 5 days. In chicks on a pantothenic acid-deficient diet, the simultaneous administration of ω-methylpantothenic acid did not alter the course of the infection with *P. lophurae*."

WILCOX, Aimee, TOMLINSON, T. H., Jr. & BALLARD, Mary B. **A Morphological Alteration in** *Plasmodium gallinaceum.* *J. National Malaria Soc.* 1950, Sept., v. 9, No. 3, 249–55, 2 figs.

Peculiar forms of *Plasmodium gallinaceum* were produced at will in chick embryos infected with this species. In blood films stained with Giemsa many of the parasites, including both asexual and sexual (but not apparently exo-erythrocytic) stages, were seen to contain large clear round unstained areas with clean-cut edges. These " vacuoles " occupied a large part of the body of the parasites and contained the pigment, either in clumps or scattered around the edge ; they were invisible in unstained wet films, but took on a homogeneous violet colour after vital staining with brilliant Cresyl blue. These forms developed in the following circumstances :—

1. Blood from chicks of an alternate mosquito-blood series was subinoculated into chicks and from them into embryos, in whose parasites the large vacuoles occurred.
2. They appeared in chicks hatching from such infected embryos.
3. Mosquitoes infected from chicks of an alternate mosquito-blood series were allowed to bite embryos ; blood forms appeared in these embryos.
4. They appeared in the earlier passages of 1 and 3 above in chick embryos.

It thus appears that some fairly recent passage of the parasite through a mosquito is necessary for the production of the vacuoles, a supposition which is confirmed by their gradual disappearance in successive passages in embryos ; by about the 43rd passage vacuoles had practically disappeared. The vacuoles seem to diminish in number through each successive blood passage coincidentally with diminution in the numbers of the gametocytes.

[See this *Bulletin*, 1948, v. 45, 158.] *P. C. C. Garnham*

HAHN, P. F., HAAS, V. H. & WILCOX, Aimee. **Arrest of Development of *Plasmodium gallinaceum* in Mosquitoes (*Aedes aegypti*) by Radiation Effect of P^{32}.** *Science.* 1950, June 16, 657–8.

In these experiments 250 *Aëdes aegypti* were fed on chicks infected with *Plasmodium gallinaceum*, with numerous gametocytes in the blood. Subsequently 150 of the mosquitoes were fed on 5 per cent. glucose solution in which the radioactive substance (P^{32}) was in the form of sodium acid phosphate, while 100 received only glucose solution. When samples of the mosquitoes were dissected 9 days after the infecting feed, oöcysts in approximately equal average numbers and in the same stage of development were found in the stomachs in both groups, but examinations carried out 5 days later showed that sporozoites had developed only in mosquitoes of the 2nd group, whereas no sporozoites could be detected in 93 mosquitoes which ingested P^{32}. Measurements made on the salivary glands of 87 mosquitoes thus treated showed radioactivity from 334 to 14,000 (average 2,400) cpm. In spite of this relatively high degree of radioactivity, there were no apparent harmful effects on the mosquitoes themselves. These observations demonstrated "that the amount of radiation in the salivary glands and/or the mosquito as a whole was sufficient to arrest development of the parasites during the oocyst stage."

C. A. Hoare

BLACKWATER FEVER

BUTTS, D. C. A. **A heretofore Unreported Agglutinable Human Blood Factor and its possible Relationship to Blackwater Fever.** *Amer. J. Trop. Med.* 1950, Sept., v. 30, No. 5, 663–7.

In a previous paper [this *Bulletin*, 1946, v. 43, 533] the author suggested that the human malaria parasite might contain an antigen like the Rh antigen which could in course of time develop haemoagglutinins in a Rh-negative person "in sufficient concentration to bring about the destruction of the parasitized cells." Study of cases of blackwater fever in Cuba and Guatemala, however, showed that the syndromes could develop in either Rh negative or Rh positive persons.

A search was made for a possible blood factor not associated with the AB and Rh systems, and "by virtue of their homozygous Rh negative structure, and their possession of other blood groupings similar to man, *i.e.*, AB and MN" chimpanzee erythrocytes were selected as antigen. It was assumed by the author that the hypothetical haemoagglutinogen in the chimpanzee would be also present in the majority of normal human beings. Sera were prepared in rabbits with erythrocytes from three chimpanzees (a female, A, M and Rh negative ; two males, both O, MN, and Rh negative), and were absorbed with packed O, MN and Rh positive human erythrocytes. The absorbed sera were tested against samples of group O blood obtained from 103 white subjects and 77 negroes, both male and female. About 97 per cent. of all human cells agglutinated in some degree in the anti-chimpanzee sera.

The author concludes that there is in most human erythrocytes a haemo-agglutinogen which he designates as the " Ch " factor.

[The author comments that preliminary experiments (not mentioned except in his " Discussion ") with blood heavily parasitized with *P. falciparum*, suggest that the malarial parasite possesses a relatively strong " Ch-like " agglutinogen. The results of these experiments are awaited with interest.]

B. G. Maegraith

LOMBARD, G. & MARCHALANT, L. Un cas de fièvre bilieuse hémoglobinurique traitée par le plasma desséché. [**A Case of Blackwater Fever treated with Dried Plasma.**] *Bull. Méd. de l'Afrique Occidentale Française.* 1949, v. 6, No. 1, 67–9.

A patient gravely ill with blackwater fever, out of the range of hospital facilities, was given a transfusion of 500 cc. reconstituted dried plasma. This was followed by marked improvement in the patient's condition : he made a complete recovery.

Norman White

TRYPANOSOMIASIS

MAILLOT, L. Travaux effectués en 1948 par les entomologistes médicaux et vétérinaires de l'Institut d'Etudes Centrafricaines (Office de la Recherche Scientifique Coloniale) travaillant à l'Institut Pasteur. [**Work of the Entomologists of the Institute of Central African Studies at the Pasteur Institute, Brazzaville, in 1948.** *Rapport sur le Fonctionnement Technique de l'Institut Pasteur de Brazzaville en 1948.* 80–93.

In this report on tsetse flies and mosquitoes of French Equatorial Africa, locality records are given for *Glossina palpalis palpalis*, *G.p. fuscipes*, *G. morsitans morsitans*, *G. newsteadi*, *G. tachinoides*, *G. tabaniformis*, *G. schwetzi*, and *G. nigrofusca*. There are figures for tsetse density in 1948, proportions of sexes, duration of the pupal stage and rates of infection with *Trypanosoma gambiense* [*G. p. fuscipes* ?].

A list of mosquitoes is given in a table showing monthly collection of larvae.

H. S. Leeson

JACKSON, C. H. N. **On Two Advances of Tsetse-Fly in Central Tanganyika.** *Proc. Roy. Entom. Soc. of London.* Ser. A. 1950, June 15, v. 25, Pts. 4/6, 29–32, 1 folding map.

Over a period of nearly twenty years, the author has studied a number of advances of *G. morsitans* in Central Tanganyika [see this *Bulletin*, 1934, v. 31, 601]. During that period several reports have appeared in print, and unpublished papers have been available in his department. The particular advances referred to in this paper have been on the east and west side of Singida in Central Tanganyika. No other advances of this insect have been studied so completely, or for over so long a period : the whole forms a most interesting story, clearly set out on the map.

In his earlier paper Jackson had forecast the direction in which future advances of this insect would probably take place. Events have proved that he was correct in so far as the fly has continued to go forward through *Brachystegia* woodland, but there has also been an unexpected advance through dense *Acacia* which has not proved to be a barrier. In one place an attempt was made, unsuccessfully, to stop the advance of the insect by clearing woodland and settling villagers.

The cause of this event is unknown. The phenomenon is not one of ebb and flow, but rather of continuous advances into a considerable area, which the insect has certainly not occupied previously for a very long period.

P. A. Buxton

MOGGRIDGE, J. Y. **The Relations of the Coastal Tsetse of Kenya to the Plant Communities.** *Bull. Entom. Res.* 1950, Sept., v. 41, Pt. 2, 301–15, 4 figs. on pl. & 1 text fig.

A study of the distribution of *Glossina pallidipes* in the coastal region of Kenya showed that it is evenly dispersed throughout all types of natural vegetation, even in the densest thickets, but absent from areas of cultivation. This species and *G. austeni* both showed marked " rush activity " in the early morning [this *Bulletin*, 1950, v. 47, 332].

G. brevipalpis was also generally distributed but appeared to show a preference for less dense thicket and was mostly encountered at dusk. Two good oblique air photographs demonstrate the value of this type of photograph in illustrating the distribution of vegetation in an area. . . . *M. T. Gillies*

FORSTER, E. F. B. **Status Epilepticus : a Symptom Complex of African Trypanosomiasis.** [Memoranda.] *Brit. Med. J.* 1950, Oct. 28, 987–8.

The significant thing in this report is that the attack of status epilepticus started about 12 hours after the first injection of 2 gm. of tryparsamide to an African patient who had been found to have trypanosomes in the cerebrospinal fluid as well as in the lymph glands. He had previously received two 1 gm. doses of antrypol. The attack lasted about two hours and was followed by confused and grotesque behaviour for 10 days. At the end of this period trypanosomes were found in the cerebrospinal fluid but no mention is made of its cell content. Two relapses occurred on successive days three weeks later, whether related to further tryparsamide treatment is not stated. The cerebrospinal fluid was now negative. His mentality was " childish " on discharge a month later. The attacks had been controlled by intramuscular hexobarbitone.

C. C. Chesterman

MONNET, A. Sur la possibilité de différenciation et éventuellement de dosage des arsenicaux de Friedheim par colorimétrie. [**The Possibility of the Differentiation and the Eventual Estimation of Friedheim's Arsenicals by Colorimetry.**] *Bull. Méd. de l'Afrique Occidentale Française.* 1949, v. 6, No. 2, 169–72.

KLEINE, F. K. Die Bekämpfung der Tsetsefliege in Afrika. [**Control of Tsetse Flies in Africa.**] Reprinted from *Berlin. u. Münch. Tierärzt. Woch.* 1950, No. 9, 173.

This is a short critical survey of the problems of African trypanosomiasis by Professor Kleine whose researches during the last fifty years entitle him to speak with authority on the subject. Trypanocidal drugs have been more successful in man than in domestic animals which are infected with several species of trypanosome and whose resistance varies both individually and in different species of animal. As regards the question of tsetse fly control, Professor Kleine thinks that although no single measure, except human settlement, will alone suffice to clear the flies from infested regions, a suitable combination of different methods will gradually lead to success. The most important methods in his opinion are the destruction of wild game animals where necessary and the simultaneous use of insecticides. *J. F. Corson*

MORRIS, M. G. **The Persistence of Toxicity in DDT-Impregnated Hessian and its Use on Tsetse Traps.** *Bull. Entom. Res.* 1950, Sept., v. 41, Pt. 2, 259–88, 3 figs.

Experiments were conducted in 1946 to 1948 to investigate the persistence of toxicity to tsetse of hessian, impregnated with DDT and exposed to the weather conditions of the inland Savannah region of the Gold Coast. Hessian was treated by being soaked in a saturated solution of DDT in kerosene, once or twice (which gave deposits of 4·4 and 7·4 gm. DDT per sq. ft. respectively) and also by being dipped in DDT emulsions. Flies were collected by fly-boys on the day of test and exposed individually in test tubes, so that 15 or 60 seconds' contact was obtained. Results were assessed from batches of about 20 to 25 flies.

Two separate experiments in 1946–1947 gave rather similar results ; the speed with which the exposed flies died, fell off markedly in the first 2–3 weeks and then appeared to increase ; afterwards remaining roughly constant up to the end of the test for 20–30 weeks. The author analyses her data [with considerable elaboration, in half a dozen different ways] and reaches the conclusion that these anomalies are due to the following effects.

Part of the initial decline may be due to drying of the kerosene which contributed to the toxic effect of the impregnation. The apparent increase in effectiveness of the treated hessian was probably due to changing meteorological conditions. In both experiments (and in some later field tests) the change was noted about October–November, irrespective of the time of treatment of the hessian. After this time the weather became hotter and drier. Under the cooler moister conditions at the beginning of the experiments, the DDT seemed to be slower in taking effect. (This was supported by the fact that slightly moist hessian was less effective than that in a dry or wet condition.) Under hot, dry conditions, the flies were less hardy and there was a great reduction in time of survival of control flies. Also, the flies caught in the drier period were generally smaller in size and presumably more sensitive.

These laboratory tests included comparisons of the effectiveness of hessian treated at two rates and samples kept in closed boxes as compared with weathered cloth. The general conclusion reached by the author is that, notwithstanding some initial decline in toxicity, the treated hessian remained actively and usefully insecticidal for many weeks (this differs from the conclusions of HOCKING, HADAWAY and WOODCOCK of the Colonial Insecticide Research Station, Entebbe, who concluded that weekly impregnation of hessian would be necessary in Uganda).

The use of impregnated hessian was tried in conjunction with animal traps in the field. It was expected that the DDT might repel the flies to some extent, but the actual result showed notably higher catches in the treated trap than in three untreated ones over a period of 5 weeks (positions changed weekly). This is interpreted as being due to a considerable proportion escaping from untreated traps, whereas the contact with the DDT caused the flies in the treated trap to die before any could escape.

Experiments were done with traps treated with kerosene and with emulsion as vehicles for the DDT. The emulsion deposit appeared to be more effective (especially at first) in dry weather, but the position was reversed in the rainy season.

It is concluded that DDT impregnation of the hessian of animal traps is an improvement in tsetse control and would be especially useful for traps near a much-frequented water source (where trypanosomiasis transmission is frequent). A single treatment with an emulsified preparation should be effective for at least three months in the dry season. *J. R. Busvine*

TORRICO M., R. A. Conocimientos actuales sobre la epidemiología de la enfermedad de Chagas en Bolivia. [**Epidemiology of Chagas's Disease in Bolivia.**] *Bol. Oficina Sanitaria Panamericana.* 1950, Aug., v. 29, No. 8, 827–40, 1 fig. (map). [15 refs.] English summary.

Though the numbers of cases of Chagas's disease in Bolivia are fairly high the author believes that those reported make up only a fraction of the actual prevalence. He names 8 species of Triatomidae found, namely, *Triatoma infestans, Eutriatoma sordida, E. oswaldoi, E. venosa, Rhodnius pictipes, Panstrongylus geniculatus, Psammolestes coreodes* and *Eratyrus mucronatus* and their localities. *T. sordida* is very important in some areas, but *T. infestans* is the chief vector because, speaking generally, it is more widely prevailing in the whole country, from the high levels down to the tropical eastern lowlands where it may be found in practically every dwelling.

There is a line map showing the distribution of the different vectors, of human cases, and of animals found infected in nature, guineapigs, dogs and cats. The opossum, *Didelphys paraguayensis,* was strongly suspected but not proved, either by blood examination or by xenodiagnosis. Indexes of infection of *T. infestans* are given in a table for 26 sub-districts of Cochabamba department ; in 3 it was over 90 per cent. and in only one was it under 30 per cent. The kitchens and sleeping apartments are ideal places for the vectors to hide in.

Since the beginning of 1948 new cases discovered among children and adults number 73 in Cochabamba alone [the tabular statement perhaps includes earlier cases, for the figures there give 28 proved by blood examination and 60 by xenodiagnosis]. Altogether 35 and 182 cases respectively have been proved by these two methods. *T. cruzi* was found in the blood of an infant six months old. Prevention has not yet been taken in hand seriously. DDT was tried but not persisted with when it was found to be ineffectual against Triatomidae. *H. Harold Scott*

LEISHMANIASIS

CHAKRAVARTY, N. K., SEN GUPTA, P. C., BOSE, J. P. & DE, U. N. **Biochemical Investigations in Kala-Azar. Parts II and III.** *Indian J. Med. Res.* 1949, Oct., v. 37, No. 4, 401–10, 1 graph. [17 refs.]

It has been suggested that hypo-adrenia is one of the causes of the dark skin in kala azar (NAPIER, *Principles and Practice of Tropical Medicine,* 1943. Calcutta, Thacker, Spink) and DE [this *Bulletin,* 1934, v. 31, 663] reported finding parasitized macrophages in the suprarenal cortex in 2 of 26 autopsies on subjects with kala azar.

The Cutler test was carried out in 53 cases of kala azar in Calcutta (CUTLER, POWER and WILDER, *J. Amer. Med. Ass.,* 1938, v. 111, 117). This test consists in withdrawing salt from the diet for 52 hours under standard conditions and measuring the chloride or sodium excretion during the final four hours. In adrenal insufficiency, urine of high chloride content is excreted. According to Cutler's diagnostic standards, such an excretion of over 370·8 mgm. per cent. as sodium chloride indicates adrenal insufficiency and a figure of 206 mgm. per cent. is a sign of normal function of the adrenal cortex. The maximum urinary chloride concentration in a series of 12 normal controls was 300 mgm. per cent. and the mean and standard deviation 153·0±85·2 mgm. per cent. In the cases of kala azar it was 262·7±158·8 mgm. per cent. ; in sixteen cases it was higher than the highest normal 300 mgm. per cent. There is thus evidence

of hypo-adrenia in 30 per cent. of the cases tested. On Cutler's standards, 9 cases gave a positive result, 21 a doubtful, and 23 a negative result. Higher concentrations were obtained in the more advanced cases.

The plasma-chloride values were also estimated. In 10 controls the lowest plasma chloride was 588 mgm. per cent. ; 43·4 per cent. of the cases of kala azar showed a figure below this. On the normal standards (560 mgm. to 630 mgm. per cent. *vide* PETERS and VAN SLYKE, *Quantitative Clinical Chemistry*, 1931. London, Ballière, Tindall and Cox) 10 cases of kala azar had subnormal plasma chloride.

In 3 cases desoxycorticosterone acetate was given during the Cutler test and in 2 there was a well-marked decrease in excretion of chlorides, whereas in the third there was a slight decrease.

It is concluded that hypo-adrenia is fairly common in kala azar and is the cause of the hyper-pigmentation, and probably also of the emaciation, low blood pressure, and asthenia.

In the second part of this paper the authors report that the urea-nitrogen was above normal in 2 of 30 cases and the non-protein-nitrogen in 1 of 10 cases, and that the blood sugar was below normal in 2 of 30 cases and the blood cholesterol in 13 of 30 cases. *L. E. Napier*

RAGHAVAN, N. G. S. & SATYA PRAKASH. **A Preliminary Note on Napier and Chopra Tests carried out in 'Reconstituted Sera' of Kala-Azar Cases.** *Indian J. Malariology*. 1949, June–Sept., v. 3, Nos. 2/3, 207–10.

During a malaria survey in Nepal, samples of finger blood were taken on pieces of blotting paper which were then kept either at the "room temperature" [not more specifically indicated] or in the refrigerator. Other blotting paper samples were made from citrated blood. The serum was reconstituted by cutting the blotting paper into small pieces and soaking them in 2 ml. of normal saline for an hour. The reconstituted serum was drawn into a capillary tube ; the lower end of the tube was dipped into formalin or urea stibamine solution to perform the Napier or Chopra tests, respectively. The final dilution of the serum was calculated to be 1 in 1,000.

The test was carried out in 24 cases of kala azar and in 288 controls [161 human, 127 monkey]. The Chopra test was positive in all the kala azar cases and in one control, whereas the Napier test was uniformly negative. The best strength for the Chopra test was 2 per cent. urea stibamine.

It is considered that this technique for the Chopra test might usefully be adopted for field work, but that the serum solution is too weak to give the Napier test. *L. E. Napier*

RAGHAVAN, N. G. S. **A New Method of Diagnosis of Kala-Azar.** *Indian J. Malariology*. 1949, June–Sept., v. 3, Nos. 2/3, 199–205. [14 refs.]

During a malaria survey in Nepal, where both malaria and kala azar are hyperendemic, blood slides were made and blood was collected in a capillary tube containing potassium citrate ; the latter was used for testing for kala azar :—

Into a capillary tube 1 mm. by 9 cm., 2 per cent. potassium citrate was drawn up to one-quarter the length of the tube and blood was drawn up until the column reached two-thirds of the way up the tube. The tube was stuck into plasticine vertically and after an hour the lower end of the tube with a plug of plasticine and the sedimented cells was filed off and the broken end dipped into 40 per cent. formalin until the column rose to nearly three-quarters of the length of the tube. In positive cases a leucogel formed after a varying

period. To facilitate the reading diffusible dyes were used, both eosin and methylene blue (J.S.B. Stain, No. 1) ; the latter became decolorized in eighteen hours in positive sera. With reference to eosin the author states that it " diffused very quickly through the colourless column of formalin and serum thus carrying the formalin through [and] affording it a better chance of diffusion ".

" When eosin was added to the serum with formalin, the colour started changing rapidly from the fluorescent red to a light rose colour. With jellification setting in completely, this light rose was kept unbroken even after shaking. In normal cases the eosin colour in the serum formalin column was unchanged and was liquid throughout the column.

" In carrying out Chopra tests, the two per cent solution of potassium citrate was taken in capillaries to about two-thirds of its length. Blood from the pricked finger was drawn till the resultant column was about three-fourths of its length. This meant a dilution of the serum of about 1 : 8. The other steps taken were the same as in Napier test except that 4 per cent urea stibamine was used in place of formalin."

The eosin did not diffuse well through the floccules, even after standing for several hours, with a positive serum ; but if it was added to the serum before the urea stibamine it diffused well.

The four tests, the original Napier and Chopra and the author's modifications were carried out on 336 sera of which 22 were taken from cases of kala azar ; all the latter were positive in all the tests and all the controls were negative.

[There seem to be possibilities in the addition of dyes to facilitate the reading in these tests where small amounts of serum are used, but the author nowhere states exactly how he added the dyes, which dye he preferred, or in what strength, in the tests he reports. Furthermore, there is no evidence on what the diagnoses depended in either the positive or the negative cases ; since it was a field experiment, one must assume that he relied on the tests themselves for this.] *L. E. Napier*

FEVERS OF THE TYPHUS GROUP

WOLBACH, S. B. **Rickettsiae and Rickettsial Diseases of Man : a Survey. Howard Taylor Ricketts Award Lecture, 1950.** *Arch. Pathology.* 1950, Nov., v. 50, No. 5, 612–22. [Refs. in footnotes.]

FREYCHE, M. J. & DEUTSCHMAN, Z. **Human Rickettsioses in Africa.** *Epidemiological & Vital Statistics Rep. W.H.O.* 1950, July–Aug., v. 3, Nos. 7/8, 160–201, 3 maps & 1 graph. [Numerous refs.] [In parallel French & English.]

In this important article the authors give a critical summary of the extensive literature dealing with the recognition, epidemiology and distribution of the rickettsial fevers of Africa.

The main conclusions reached are largely those of a Joint Study Group of experts appointed by the *Office International d'Hygiène Publique* and the World Health Organization which met early in 1950 for the purpose of determining the present state of knowledge of human rickettsioses in Africa.

The present article is based on a study of about 400 contributions to the literature of the subject, to which references are given in the bibliography attached to the paper. There are five maps, three of which show the probable distribution in Africa of the fevers of the typhus group and Q fever ; the other two deal respectively with the known distribution of ticks and lice in areas in which they are known or believed to be vectors of typhus fevers and with the types of climate prevailing in different parts of Africa.

The subject is greatly simplified by the adoption in principle of the classification of the typhus-group fevers in accordance with the vectors, though the nomenclature of these fevers in the headings of sections of the text and the captions of the maps shows a number of variations. The names louse-borne epidemic typhus, epidemic typhus, typhus exanthematique and typhus are employed ; so also are flea-borne endemic typhus and murine typhus, and again tick typhus and tick-borne typhus. In the brief section headed mite-borne typhus the first sentence is unhappily worded " Does tropical typhus exist in Africa ? ".

These variations in nomenclature are trivial in comparison with the confusing multiplicity of names found in the articles to which references are given in the bibliography, and the authors themselves state that the " climatic fevers ", " African pseudo-dengue " and " Congolese red fever " are probably rickettsial diseases.

Sympathetic consideration is given to isolated workers who have inadequate facilities for differential diagnosis based on the antigenic properties of the rickettsiae. The Weil-Felix test and animal inoculation are mentioned as being inadequate, and modern methods like complement-fixation and rickettsia-agglutination tests are not generally available.

The largest section deals with louse-borne typhus, of which a remarkable epidemic wave occurred during the second world war in North and South Africa. The following figures show the numbers of cases reported in the peak year in the countries chiefly affected ; the smaller figure, in brackets immediately following in each case is for 1949, it shows the equally remarkable decline that occurred after the epidemic.

In Algeria in 1942 there were 37,643 cases (99). In French Morocco in 1942 there were 28,802 cases (19). In Tunisia in 1942 there were 16,564 cases (68). In Egypt in 1943 there were 40,188 cases (186), and in South Africa in 1944 there were 5,623 cases (244).

In the notes to the maps it is stated that the endemic areas of louse-borne typhus are in general situated within regions with " Mediterranean " and mountain climates, and that in tropical Africa the endemic areas are located above the 1,000 metre level.

Flea-borne typhus is widely distributed throughout Africa, though relatively few cases occur in each locality.

Tick typhus is also widespread in its distribution ; various names have been given to the disease in different areas, such as boutonneuse fever, pseudo-boutonneuse fever, tick-bite fever and tick typhus. Differences of opinion exist with regard to the question whether these are variant types of the same disease or related but distinct diseases.

The authors do not believe that there is any clear evidence of the occurrence of mite-borne typhus in Abyssinia or any of the other African countries in which the disease has been suspected.

The rickettsiae of Q fever have been isolated from ticks or human beings in Morocco, Algeria, French West Africa, French Equatorial Africa, and the Transvaal. *John W. D. Megaw*

D'IGNAZIO, C. & CODELEONCINI, E. Sull'incubazione del tifo esantematico epidemico. [**The Incubation Period of Epidemic Typhus.**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1950, May, v. 31, No. 5, 378–92. English summary.

From a study of the literature and personal observations the authors conclude that the incubation period of louse-borne typhus is nearly always longer than two weeks ; they regard the average as being about 18 days.

John W. D. Megaw

GISPEN, R. **The Virus of Murine Typhus in Mites** (*Schöngastia indica*, **fam.** *Trombiculidae*). *Documenta Neerlandica et Indonesica de Morbis Tropicis.* Amsterdam. 1950, Sept., v. 2, No. 3, 225–30, 1 fig. [10 refs.]

The author reports the isolation of five strains of *Rickettsia mooseri* from mice inoculated with pools of larval mites (*Schöngastia indica*). The total number of mites was 2,598, and all were collected from rats in Djakarta.

Four of the strains were from mites collected from uninfected rats, two of which were *Rattus rattus diardi* and two were *R. norvegicus*. The fifth strain was from mites found on an infected *R. norvegicus*.

Scrotal reactions occurred in 25 to 100 per cent. of male guineapigs inoculated with each of the strains, and typical Mooser cells were found in smears of the tunica vaginalis and peritoneum of the animals.

Complement-fixation tests carried out on the guineapigs gave positive results with two strains of murine typhus antigen and negative results with a strain of Javanese scrub typhus antigen.

A large percentage of wild rats in Djakarta were found infected with *R. mooseri* so it seemed likely that the mites could be important vectors of the disease from rat to rat. The mites do not bite human beings so rat-to-man infection is not likely to occur. *John W. D. Megaw*

MOREAU, P. La fièvre exanthématique boutonneuse congolaise. (Considérations sur sa symptomatologie.) [**The Boutonneuse Exanthematic Fever of the Congo.**] *Méd. Trop.* Marseilles. 1950, Mar.–Apr., v. 10, No. 2, 301–5.

Since 1944 a steadily increasing number of cases of a typhus-like fever have been admitted to the hospital at Brazzaville under the name Congolese red fever. The author bases his clinical description on 50 cases seen by himself.

The onset was sudden, with chill ; the duration was 7 to 14 days ; none of the cases was fatal. There was generalized adenopathy. The rash consisted of slightly raised macules distributed all over the body except that the palms and soles were seldom involved.

There was a local lesion which usually took the form of a painless round or oval ulcer situated most often on the scrotum or surrounding region, but sometimes in the axilla or sub-mammary area ; sometimes the lesion consisted of a prominent papule, darker in colour than the rash ; in only one case was the lesion a *tache noire*.

There was no evidence to show which vector or vertebrate reservoir of infection was concerned. Animal inoculation gave negative results, but the fever was regarded as being obviously related in its clinical features to scrub typhus and Rocky Mountain spotted fever.

It differed from " classical " Congolese red fever in the occurrence of a local lesion. *John W. D. Megaw*

DELAY, P. D., LENNETTE, E. H. & DEOME, K. B. **Q Fever in California. II. Recovery of** *Coxiella burneti* **from Naturally-Infected Air-Borne Dust.** *J. Immunology.* 1950, Aug., v. 65, No. 2, 211–20, 1 fig. [32 refs.]

The authors in three attempts out of five succeeded in isolating the rickettsia of Q fever from dust-laden air in places occupied by cattle or sheep infected with the disease. The dust was trapped in beef-extract broth contained in " sampling atomizers " through which 800 to 900 litres of air were passed after the soil had been agitated with a broom to simulate the conditions produced by the trampling of the animals.

In the first successful experiment the dust came from a pen in which 36 cows belonging to an infected herd had been kept. In the second case the air was

taken from a barn in which an infected flock of sheep had previously been kept, but during the previous 30 days none of the animals had access to the part of the barn in which the air samples were taken. The third strain was isolated from air over a yard adjoining the same barn and occupied for 30 days by the sheep that had been excluded from the barn.

In all three experiments inoculated guineapigs developed complement-fixing antibodies when tested with the Henzerling (Italian) strain of antigen.

The experiments are regarded as supporting the views of several observers who have strongly suspected that certain laboratory and other outbreaks of Q fever described by them were due to the inhalation of infected dust.

John W. D. Megaw

BARTONELLOSIS

WIGAND, R. & PETERS, D. Neuere Untersuchungen über Bartonella muris Mayer. (1. Mitteilung.) [**New Investigations of** *Bartonella muris* **Mayer.**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1950, Sept., v. 2, No. 2, 206–20, 1 chart & 6 figs. [33 refs.]

The material used in this study was derived from 250 rats weighing between 100 and 250 gm. A few black and brown rats were included in the series, but the vast majority were white laboratory animals. Splenectomy was employed to make the infection manifest itself in the peripheral blood, and this procedure was carried out with a death rate of less than 4 per cent.

The incubation period, that is the interval between splenectomy and the time when parasites could be demonstrated in the erythrocytes, was determined for 207 rats, and was found to vary considerably. After 24 hours, over 10 per cent. of the rats showed parasites ; on the second and third days a further 30 per cent. became positive daily ; and by the 6th day about 90 per cent. of the animals had overt infections. Parasites appeared later, even after the 9th day, in 14 others, but 5 rats remained clear for periods up to 30 days. Since the animals were neither isolated nor freed from ectoparasites, no opinion can be given as to whether the 14 rats showed an unusually long latent period, or were secondary cases due to transmission of *Bartonella muris* from the infected rats. The peak of infection occurred from 1 to 3 days after the first appearance of parasites, that is from 3 to 7 days after splenectomy. The proportion of erythrocytes affected varied over a wide range, but in some cases reached over 80 per cent.

Parasites remained in the blood for about 3 to 6 days, as a rule, though here also the variation was marked. Many rats were killed at the height of infection to obtain blood for various purposes, and in only 45 animals was it possible to follow the course of infection. For the same reason, the virulence of the organism could not be determined with any degree of accuracy. It was however noted that of 25 rats which had a mild primary attack, 11 died during the first relapse. Some of the rats suffered from repeated relapses, 7 in one case. There was no constancy about the severity of first or subsequent relapses, nor about the length of the free periods ; intervals of anything from 2 to 16 days were equally common.

Over 400 preparations, of material derived from 170 rats, were fixed in formalin and studied by electron microscopy. Morphologically *Bartonella* appears as a sphere, 0·3 to 0·5 μ in diameter. The smaller forms are opaque and sharply-defined ; the larger types show a hazy outline and, when " shadowed ", appear to be flattened. The latter are probably degenerating forms.

The bacterial forms seen by normal microscopy proved to consist of short chains of 2 to 4 spherical elements. If a larger number are joined together, and the terminal members are degenerating, dumb-bell appearances may be simulated. During the advanced stages of infection, very large aggregates may be formed. [All these variations are illustrated in a series of photographs.] No evidence was obtained of any internal structure, nor of the presence of a limiting membrane.

Bartonella was never seen outside the erythrocyte ; in ordinary preparations, haemolysis may give rise to the impression that parasites are lying free in the field, but the " ghost " of the affected red cell is always visible in electron microscopy. There was never any indication of flagella ; nor could dividing forms be differentiated.

Examination, by ordinary light microscopy, of a series of stained films from 13 rats confirmed the observations of previous workers that *Bartonella* attacks normal erythrocytes in preference to polychromatic or nucleated forms. Analysis of the findings by statistical methods indicated that the differences found in many of the rats were " significant " in a statistical sense. [It should perhaps be noted that the authors used the σ test in their analysis, whereas most workers would consider Student's " t " test more appropriate in cases of this kind.]

The infection could be transmitted to clean, splenectomized rats quite easily by the inoculation of unclotted blood, but relapses in these animals appeared to be less numerous, and were milder in character. The antigenic relationship to rickettsiae, which has been suggested to exist, was investigated by testing the sera of 35 rats against *Proteus OX19* ; *HXK* ; and *OX2*. The sera were collected at various intervals of time after the disappearance of parasites (a few after a number of relapses had occurred) but agglutination reactions were negative in every instance.

The prophylactic effect which has been claimed for neoarsphenamine was tested by injecting 3 mgm. into 26 rats at the time of splenectomy. The weight of these animals varied between 120 and 220 gm., but all received the same dose. Of these rats, 19 remained clear of infection for 30–40 days ; 5 died of intercurrent infections, or were killed within that period. *Bartonella* appeared in the remaining 2 rats on the 11th and 24th days respectively. It is thought that, in these cases also, infection may have been transmitted to the animals after the drug had been excreted.

Aureomycin was used prophylactically by giving, by stomach tube, either 25 or 75 mgm. on the day before splenectomy, and the same dose at the time of operation. The incubation period was lengthened by this treatment, but all the animals finally showed parasites. When however a single dose of 25 mgm. was injected subcutaneously at the time of splenectomy, no parasites appeared for at least 30 days.

At the height of infection in 6 rats, each received 25 mgm. by inoculation, and the animals were apparently completely cured. Half this dose caused disappearance of the parasites in 3 rats, but two died later and the third showed a relapse on the 16th day. The oral dosage corresponds to 150 to 450 mgm., and the subcutaneous to 150 mgm. per kilo body weight. *J. C. Broom*

REESE, J. D., MORRISON, M. E. & FOWLER, E. M. **Complement Fixation and Weil-Felix Reaction in Rabbits inoculated with** *Bartonella bacilliformis*. *J. Immunology*. 1950, Oct., v. 65, No. 4, 355–8.

Five strains of *Bartonella bacilliformis* which had been maintained in laboratory culture for periods ranging from three months to ten years were used in this work. Organisms from solid media were washed, suspended in

distilled water and heated to 100°C. for three hours. The sera of rabbits immunized with the five strains were tested for complement-fixing antibodies against the various antigens thus prepared. No antigenic differences between the strains could be detected. Agglutinins to *Proteus OX19, OXK* and *OX2* were not found in the sera.

J. C. Cruickshank

ANGULO BAR, J. Hepatitis en el curso de la bartoneliasis humana (enfermedad de Carrión). Estudio de dos casos aplicando pruehas funcionales hepatobiliares, con referencia especial a la reacción del oro coloidal y cefalina-colesterol. [**Hepatitis in Carrión's Disease.**] *Prensa Méd. Argentina.* 1950, July 14, v. 37, No. 28, 1559–74, 3 figs. [64 refs.]

The author presents a very detailed record of the liver function in two cases of human bartonellosis. The examinations, which were numerous, were carried out every few days for 7 weeks in one case and for 6 weeks in the other and included the blood bilirubin, the direct van den Bergh, colloidal gold, cephalin-cholesterol, total and free cholesterol and cholesterol ester, the total proteins, albumin and globulin, full haematological examination, bromsulphthalein-retention test, and the proportion of red cells containing *Bartonella.* For details of each of these the original paper must be referred to, but the following general conclusions may be stated : That in this disease an infectious hepatitis may occur, as in certain other infective diseases ; serious lesions of the liver may be caused, as is shown by the colloidal gold test and the high degree of flocculation of cephalin-cholesterol, diminution of cholesterol esters in the serum, a rise in serum-globulin with a fall in serum-albumin, the albumin / globulin ratio being thus below unity ; the bromsulphthalein test indicates interference with hepatic function. When penicillin is given these indications of dysfunction are gradually reversed and in 6–7 weeks return to normal values. The inference is that in treatment of Carrión's disease an important indication is to protect the liver by administration of substances rich in choline and a diet consisting largely of protein with restriction of fat.

H. Harold Scott

STANTON, M. F., LASKOWSKI, L. & PINKERTON, H. **Chemoprophylactic Effectiveness of Aureomycin and Terramycin in Murine Bartonellosis.** *Proc. Soc. Exper. Biol. & Med.* 1950, Aug., v. 74, No. 4, 705–7.

"Both aureomycin and terramycin, started 48 to 72 hours before the expected onset of illness and continued for 9 days were found to be effective in preventing murine bartonellosis. Rats treated with these compounds developed no evidence of illness while the morbidity in the control groups was 100%, and the mortality 50 to 100%. A few bartonellae appeared in the blood of some of the treated rats, but anemia and hemoglobinuria were prevented. The chemoprophylactic effectiveness of these 2 compounds in murine bartonellosis is in contrast to negative results obtained with a wide variety of other antibiotics."

YELLOW FEVER

ROBINSON, G. G. **A Note on Mosquitoes and Yellow Fever in Northern Rhodesia.** *East African Med. J.* 1950, July, v. 27, No. 7, 284–8.

Following on the discovery of a suspected case of yellow fever in 1943, examination of more than 3,000 blood samples from Balovale, Northern Rhodesia, has shown 7 per cent. of positive protection tests.

Observations on the mosquitoes at Balovale, Livingstone and Ndola bring out two points of difference between the natural history of mosquitoes in Northern Rhodesia and in the areas of higher rainfall in other parts of Africa associated with yellow fever.

The first point is that among the mosquitoes which attack man at ground level the proved vectors of yellow fever are in a small minority, in spite of their presence in considerable numbers in larval collections. In adult catches made at Balovale during the wet season November to May only 1 per cent. (5 species) were tree-hole breeders ; among these were *Aëdes aegypti* and *Aëdes simpsoni*. At Livingstone, *Aëdes metallicus* was present to the extent of 2 per cent., while *Aëdes luteocephalus*, *aegypti* and *simpsoni* together comprised less than 1 per cent.

In catches at Ndola, 1 per cent. was the aggregate catch of *Aëdes africanus*, *Aëdes simpsoni*, *wellmani*, *longipalpis*, *luteostriatus* and *haworthi*.

The second difference is that in Northern Rhodesia there is a long dry season during which it was thought that mosquitoes breeding in tree-holes were absent in the adult stage, but their survival was recently suspected as a result of the examination of a series of bamboo pots kept in trees for a whole season.

Evidence has now been collected that some of these tree-hole breeders do survive the dry season as adults and further work may show whether they could maintain the yellow fever virus in any possible non-human transmission cycle. The bionomics of these mosquitoes will have to be studied in greater detail. *H. S. Leeson*

GALINDO, P., TRAPIDO, H. & CARPENTER, S. J. **Observations on Diurnal Forest Mosquitoes in relation to Sylvan Yellow Fever in Panama.** *Amer. J. Trop. Med.* 1950, July, v. 30, No. 4, 533–74, 8 figs. (1 map). [21 refs.]

The following is the author's summary :—

" There are recorded here the distribution, the annual cycle of abundance, the vertical stratification in the forest, and the possible relationship of the forest mosquitoes attacking man to the transmission of sylvan yellow fever following an outbreak of this disease in Panama. Particular attention is directed toward species of mosquitoes which are proven vectors of sylvan yellow fever in South America, *Haemagogus spegazzinii falco* and *Aëdes leucocelaenus*.

" *Haemagogus equinus* and *H. lucifer* proved to be considerably more abundant than *H. spegazzinii falco* or *Aëdes leucocelaenus*, but, because of the small number of cases of yellow fever despite the considerate number of nonimmune persons exposed in the recent outbreak, it is suggested that these two last mentioned species may be the ones involved in the transmission of the disease to man in this area. As all of these species virtually disappear as adults during the dry season the question remains open as to how the virus is maintained during this unfavorable time of year. Two other species of *Haemagogus* taken in the study area, *H. chalcospilans* and *H. argyromeris*, were present in some abundance in the open or light second growth situations, but did not invade the forest to bite, and seem to be disqualified as vectors by the nature of their habits. The only other species which the evidence seems to render suspect is *Sabethes chloropterus*. This species demonstrates in its habits many of the characteristics of *Haemagogus*, is present in significant numbers, and seems better able to carry through the unfavorable dry season. There is, however, no direct evidence as to the ability of this species to transmit the yellow fever virus."

RABIES

PIRINGER, W. A. Zur Epidemiologie der Lyssa in Oesterreich. [**The Epidemiology of Rabies in Austria.**] *Wien. klin. Woch.* 1950, July 28, v. 62, No. 30, 517–23, 6 figs. (maps). [49 refs.]

The author, in studying rabies among animals in Austria between the years 1919 and 1949, differentiates three main enzootics, the first two were principally among domestic animals, dogs in particular, and the third one, which began in 1946, is considered to be a sylvatic form of rabies principally among foxes. The author holds that transmission by bite alone cannot solely be held responsible for the enzootic among foxes. Field mice and ticks constitute to his mind possible or even probable intermittent hosts. The only evidence for this assumption is epidemiological, with the exception of one positive experimental transfer of street virus to ticks feeding on rabid animals.

[It is recognized by the author that viraemia is an extremely rare occurrence in rabies, for which reason he introduces the possibility of accidental infection of ticks by saliva from such animals.]

In comparing the properties of street virus recovered from wild animals with those strains recovered from dogs, the author observes that the former has become less infectious for laboratory animals by all routes, that the incubation periods seem to be shorter and that laboratory animals develop for the most part the quiet type of the disease. The author advises vaccination of dogs, particularly in the border districts, and the hunting and trapping of foxes. [His suggestion to use killed street virus vaccines for that purpose seems objectionable for a number of reasons. There is also at present no experimental evidence to support the belief that a local street virus itself or after fixation constitutes a better antigen than the classical Pasteur strain. It must also be remembered that the efficacy of killed vaccine depends on the quantity of antigen it contains, and that street virus never reaches as high an infectious titre as fixed virus.]

C. R. Klimt

GUERRET, M. & LEGEAY, G. Sur un cas clinique de rage paralytique chez un bovin. [**A Clinical Case of Paralytic Rabies in a Cow.**] *Bull. Services de l'Elevage de l'Afrique Occidentale Française.* Dakar. 1950, Jan.–Mar., v. 3, No. 1, 43.

The cow had been bitten by a rabid dog.

PLAGUE

LEVINE, H. B. & GARBER, E. D. **Detection of Rough Dissociants of *Pasteurella pestis* with Tetrazolium Chloride.** *J. Bacteriology.* 1950, Oct., v. 60, No. 4, 508.

Triphenyl tetrazolium chloride has been used to detect fermentative variants of *Bact. coli* K.12 [*J. Bacteriology*, 1948, v. 56, 695]. The present authors have been able to identify rough and smooth colonies of *Pasteurella pestis* with ease on tryptose (Difco) agar containing this compound : on many other media such differentiation was very difficult.

A 1 per cent. aqueous solution of tetrazolium was sterilized by autoclaving and added to melted tryptose agar to obtain a final concentration of 0·005 per cent. About 20 ml. of medium was poured in Petri dishes, which were dried for 24 hours at 37°C. They were seeded thinly with rough and smooth forms of

a virulent and an avirulent strain of *P. pestis* and incubated at 30°C. for 4 days. At the end of this time, typical smooth colonies were round in shape and about 2 mm. in diameter : they had a sharply defined carmine centre. The rough forms were irregular in shape and were a diffused pink in colour. The differentiation could be accomplished with the naked eye, but a dissecting microscope provided the best results.

Intermediate colonies were also seen on this medium, but their frequency was very low and they developed as smooth or rough forms on subculture.

H. J. O'D. Burke-Gaffney

SWELLENGREBEL, N. H. **Plague in Java, 1910–1912.** *J. Hygiene.* 1950, June, v. 48, No. 2, 135–45.

This story of what happened when plague came to Java in 1910 is not merely instructive, it is as interesting as any tale of mystery.

The disease had existed possibly for five or six months and had already invaded more than one-quarter of the area of Java before it was recognized as being plague, and even then the Health Officers, whose leaders had " studied the Indian Plague Reports like their Bible ", were compelled to put up a long fight with the general practitioners who strongly denied that rats played any part in the spread of infection. The sceptics relied on the fact that no dead rats had been found in the affected houses and on the absence of infection among the thousands of rats examined in the laboratories during a campaign of rat destruction lasting for several months. It was found that, contrary to orders, the rats were being trapped in the open fields which yielded a far richer harvest of the animals than the plague-infected houses. The failure to find rats in the houses was eventually discovered to be due to the nesting habit of *Rattus alexandrinus* which lived and died in the hollow compartments of the bamboo beams of the houses where large numbers of dead rats were found after the mystery of their apparent absence had been solved.

John W. D. Megaw

LINK, V. B. **Plague.** *J. Amer. Med. Ass.* 1950, Sept. 30, v. 144, No. 5, 375–7.

Five cases of plague, two of which were fatal, occurred in the State of New Mexico within twelve months in 1949–50. Infection in every case was believed to have resulted from contact with wild rodents. During the same period eight other suspected cases occurred in six western States.

The patients who died were treated with penicillin only ; one patient who was " moribund " on admission made a dramatic recovery after treatment with streptomycin and sulphadiazine.

John W. D. Megaw

CHOLERA

VIOLLE, H. Action des ultra-sons sur le vibrion cholérique. [**Action of Supersonic Radiation in the Cholera Vibrio.**] *Bull. Soc. Path. Exot.* 1950, v. 43, Nos. 7/8, 391–5.

Suspensions of a culture of an Inaba strain of *V. cholerae* were exposed to irradiation from a supersonic generator giving a frequency of 260 kilocycles/second (wave length 1·8 mm.), for a period of half an hour. After treatment the suspensions, which were originally cloudy, cleared and were only faintly opalescent, a large proportion of the organisms having been lysed ; a few

elements resisted lysis. Examination of stained specimens showed all grades between typical vibrios and granular fragments remaining, but most of the vibrios had been totally destroyed. Supersonic radiation was able to kill the vibrios without also lysing them.

In some cases, when a concentrated suspension was used, a curious change occurred after a phase of homogenization, the suspension becoming more and more turbid and finally flocculating, the organisms having been killed but few were lysed. The *p*H of the suspension changed from 7 to 4 after irradiation, and the electric charge changed from negative to positive. A lysate of the vibrio treated with a specific antiserum gave a very fine precipitate at a dilution of 1 in 10, while a control with living organisms gave a gross precipitate at 1 in 1,000. The lysate was agglutinogenic on intraperitoneal injection in the guineapig and immunization with it gave some protection against a challenging dose of live vibrios.

A series of subcutaneous inoculations, in a human subject, of a suspension exposed to supersonic irradiation, produced no agglutinins active against a killed vibrio suspension, but a titre of 1 /10 was shown against a living suspension.

The author refers to the intradermal test for allergic reaction employed by BROUNST and MAROUN [see this *Bulletin*, 1949, v. 46, 935] to demonstrate immunity after inoculation with cholera vaccine. The test was negative with the irradiated vaccine. A vaccine prepared by supersonic irradiation under the conditions in which the investigations were carried out is not considered likely to be of practical value. *J. Taylor*

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

SAUTET, J., RANQUE, J., VAGUE, J. & VUILLET, J. La dysenterie amibienne dans les Bouches-du-Rhône. [**Amoebic Dysentery in the Department of Bouches-du-Rhône.**] *Rec. Travaux Inst. Nat. Hyg.* Paris. 1950, Tome 4, v. 1, 371–7, 2 figs. (maps).

In view of the increasing reports of amoebic hepatitis by doctors in Marseilles, the authors sent out a questionary to medical practitioners in the Department of Bouches-du-Rhône. This called for information on the incidence of amoebic dysentery, its clinical manifestations, neighbourhood and probable source of the infection. Most of the doctors, 125 in all, replied and as a result, 264 cases were reported. These had occurred between May 1945 and February 1946, except for 2 cases at the end of 1944. Most of the diagnoses were made on clinical grounds and while the authors discuss the possible sources of unreliability in the final figures, they feel that they are reasonably accurate as an indication of the presence of amoebiasis in the Department. In 35 cases, diagnosis was made from hepatic complication and generally evidence of intestinal dysentery was slight or lacking. There were 180 cases of typical amoebic dysentery.

There were 100 cases reported from Marseilles itself. In the rest of the Department, except for 17 cases near Arles, most of the cases were seen in the neighbourhood of the outskirts of Marseilles, for example, St. Antoine (30), Bouc-Bel Air (35), La Pomme (13). There were 7 cases in which infection took place outside the Department. The distribution is shown on two maps and in detail in a table which also indicates the probable area of infection.

The authors discuss the possible source of infection at some length. A ready explanation for the apparently high incidence of amoebiasis about that time

is to be found in the presence of large numbers of Colonial troops and sailors from all over the world, in transit or stationed in the neighbourhood of Marseilles : and in fact 29 cases were of known Colonial origin. On the other hand, 88 had no such contact : persons in transit from abroad are always numerous around Marseilles ; and in its environs, where there has been a constant passage of townspeople backwards and forwards, opportunities for infection are present.

The authors consider on the whole, bearing in mind their previous observations that there were 31 per cent. of carriers of amoebic cysts in the Marseilles area, that the ground was already prepared, and that external sources of infection were added to pre-existing endemic conditions, resulting in epidemic conditions at the time in question.

The fact that many of the initial attacks of amoebic dysentery were light has no doubt caused them to be overlooked, so that diagnosis was often made only after later complications had ensued. *H. J. O'D. Burke-Gaffney*

FAUST, E. C., SADUN, E. H., EVERRITT, Martha G., BRADIN, J. L., Jr. & LEWIS, Ruth A. **The Comparative Growth Cycle of different Strains of *Endamoeba histolytica* in Transparent Medium and of the same Strain in different Media.** *J. Parasitology.* 1950, Aug., v. 36, No. 4, 336–42.

In a previous paper FAUST *et al.* [this *Bulletin*, 1947, v. 44, 1067] described the growth of different strains of *Entamoeba histolytica* when cultivated in the same medium. Their behaviour varied considerably, but owing to the presence of diverse bacterial flora accompanying the amoebae, it could not be determined to which of the microorganisms the differences were due. In the present study the authors employed the medium S-F, devised by SHAFFER and FRYE [this *Bulletin*, 1948, v. 45, 786] in which bacterial growth was absent or negligible. A comparison was made of the growth of different strains of *E. histolytica* in this medium and in standard media with a mixed flora. Of the 3 strains used in these experiments, one (19) was grown with a single microorganism " t ", another (22) was originally obtained from a brain abscess, and the third (NRS) was in S-F medium. From each of these strains a clone was isolated by " single cell " inoculation of cultures. In S-F medium strains 19 and 22 grew at a similar rate : the population of amoebae increased rapidly during the first 48 hours, then remained stationary up to 96 hours, after which there was a gradual decline. However, strain NRS cultivated in the same medium showed a progressive decrease in numbers at each transfer. The culture of strain 22 in S-F was then compared with its growth in diphasic and monophasic media in the presence of accompanying bacteria, and with or without addition of starch. In these media the growth curve of the amoebae was like the typical pattern for bacteria grown *in vitro*, while cultures containing starch were richer than those without. It was also shown that the amoebic population in S-F medium can be considerably enhanced by increasing the horizontal surface area of the culture vessels, *e.g.*, in flasks, whereas additional vertical surface, provided by tubes, produced no significant increase. *C. A. Hoare*

DERIU, G. & PIRASTU, C. Studio radiologico del tubo digerente nell'amebiasi intestinale. [**Radiological Study of the Gastro-Intestinal Tract in Amoebic Dysentery.**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1950, July, v. 31, No. 7, 501–13, 10 figs. [12 refs.]

The English summary appended to the paper is as follows :—

" Radiological investigations of the gastro-intestinal system of a number of persons affected by chronic amoebic dysentery showed in almost all cases persistent hypermotility and hypertonus of the gastroduodenal portion, rapid

passage of barium, hypermotility of the colon, irregular contrasts, marble pattern, aerocolie, stripes and lateral shadows, sometimes like the so called 'mushroom' pattern.

"The writers conclude that X-ray results are not sufficient for the diagnosis of amoebic dysentery. The dystonic conditions of the gastro-intestinal system are —according to the writers—due to reflexes originated in the colon."

CARRERA, G. M. **Pathology of Early Amebic Hepatitis. An Experimental Study.** *Arch. Pathology.* 1950, Oct., v. 50, No. 4, 440–49, 6 figs. [Refs. in footnotes.]

In the course of an experiment on amoebic colitis in which 183 kittens were inoculated *per rectum* with *E. histolytica* of human origin, hepatic lesions developed in 2 of the animals. The 2 kittens died fourteen and seventeen days, respectively after rectal inoculation and seven days after the establishment of acute amoebic dysentery. The livers from these 2 kittens constitute the object of the author's study.

The shape and appearance of the affected areas clearly suggest their vascular origin; grossly they resembled infarcts. Of the possible routes of amoebic extension from colon to liver, that by way of the portal blood stream is generally accepted as being the most probable.

Wherever amoebae were detected in one of the large branches of the portal vein, there were small collections of fibrin filaments and leucocytes in the immediate vicinity, usually adherent to these protozoa or surrounding them. It is possible that small thrombi accompany the amoebae derived from the colonic lesions to the liver, or, on the other hand, the amoebae form the nucleus round which thrombi develop. Large thrombi were seldom seen in the major branches of the portal vein, but occluding thrombi were often present in the small interlobular veins. Amoebae were observed in and around the thrombosed vessels and extending towards the centre of the lobule. It was noted that the hepatic cells, sinusoids and reticulum in the periportal zones were better preserved than those in the mid-zones or central areas, even though the amoebae were present in the periportal sinusoids, and some of the interlobular branches of the portal vein were thrombosed. The explanation of this appears to be due to the circulatory arrangements in the lobules: the finer branches of the hepatic artery enter the sinusoids at the periphery of the lobules, and thus the periportal structures receive a better supply of oxygenated blood. In some areas of uncomplicated hepatic lesions described above there was an almost total absence of inflammatory reaction. The amoebae were seen in intimate contact with degenerating host cells and in some instances had replaced them, with no apparent inflammation; but when necrosis was extensive then inflammation was present. [This paper is illustrated with six excellent sets of photomicrographs illustrating the various points alluded to above.] *P. Manson-Bahr*

CHAKRAVARTI, H. **Studies on Plasma Protein. II. Amoebic Dysentery and Liver Disease.** *Indian Med. Gaz.* 1950, Sept., v. 85, No. 9, 394–8, 1 fig. [13 refs.]

Plasma protein estimations were performed on 71 patients suffering from chronic amoebic dysentery, 6 from acute amoebic dysentery, and 14 from amoebic hepatitis or liver abscess, at the Calcutta tropical hospital. The techniques employed were the copper sulphate drop method of Phillip and van Slyke, and the biuret method described by LOWE and CHAKRAVARTI [*Bulletin of Hygiene*, 1945, v. 20, 690].

The total protein was low in 8 (11·3 per cent.) of the chronic cases ; albumin was low in 12 (17 per cent.) ; globulin was raised in 7 (10 per cent.) ; and the albumin-globulin ratio was normal in all but 25 (35 per cent.). In the acute cases there was little departure from normal in the total protein, but a hypoproteinaemia may have been masked by haemoconcentration ; in these cases the albumin-globulin ratio was lowered owing to loss of albumin. In the cases with liver involvement the albumin was decreased and the globulin raised, especially in those cases with abscess formation. They returned to normality on recovery ; protein esitmations may therefore afford help in the early differential diagnosis of amoebic liver involvement. *A. R. D. Adams*

KOUMANS, A. K. J. Hepatitis en " tic douloureux " ten gevolge van giardiasis intestinalis. [**Hepatitis and Tic Douloureux resulting from *Giardia* Infection.**] *Nederl. Tijdschr. v. Geneesk.* 1950, Nov. 11, v. 94 (iv), No. 45, 3233–41. [Refs. in footnotes.]

The English summary appended to the paper is as follows :—

" Description of a case of a hepatolienal syndrome, which could not be assumed to be caused by anything but a large-scale infection with Giardia lamblia intestinalis. Beside a bioptically proven hepatitis a toxaemic tic douloureux existed for the last 25 years. The disease was cured by atebrin within a few days, including the tic. The hepatolienal syndrome appeared to be reversible after a diet rich in proteins and carbohydrates and poor in fats, and after combating the deficiency."

DA SILVA, L. S. **Hepatic Abscesses.** *Proc. Alumni Ass. King Edward VII College of Med.* Singapore. 1950, Sept., v. 3, No. 3, 181–96, 12 figs. [11 refs.]

The author studied the case records of nearly 5,000 autopsies carried out at the General Hospital, Singapore, since before the war and found 57 records of hepatic abscesses.

Most of these were due to the usual suppurative conditions and are discussed and analysed : the feature of special interest to readers of this *Bulletin* is that 13 were due to amoebiasis, 12 to ascariasis and 1 to melioidosis.

Seven of the amoebic abscesses were in the right lobe only, 3 in the left and 3 in both lobes. One case was in a child of 6 months. All the cases were associated with chronic amoebic lesions in the large bowel, but only two had had clinical signs of dysentery and in both the stools had been negative. Four photographs of affected livers are shown.

Hepatic abscesses due to ascariasis were found in 12 of 1,350 autopsies on children : the affected children were aged between 11 months and nine years. As only 74 children in the series were found to have died of *Ascaris* infection, the number having hepatic abscesses was relatively high. In one case, smears of scrapings from the walls of the abscesses revealed *Ascaris* ova in various stages of development. A photograph is shown of an affected liver, with the round worm *in situ*.

The case of melioidosis is not described, but it is stated that the lungs were also affected and a photograph of such a lung is given.

H. J. O'D. Burke-Gaffney

DONOSO INFANTE, A., AMENABAR CASTRO, E. & GOYENECHE PETIT, A. La perforación intestinal y la peritonitis como complicación de la amebiasis. [**Intestinal Perforation and Peritonitis complicating Amoebiasis.**] *Rev. Med. Chile.* 1950, Aug., v. 78, No. 8, 503–12. [21 refs.]

Amoebiasis can no longer be regarded as solely a tropical infection, particularly in these days of rapid transport when the patient returns to his own country and

may become a source of infection to others. Though perforation and peritonitis are not common complications of amoebiasis of the intestine, when they do occur the fatality is high.

The authors have reviewed the records of 10,000 consecutive autopsies at the Hospital San Francisco de Borja, in Chile, during the 18 years 1932–1949 inclusive. They have excluded cases of peritonitis arising from rupture of an amoebic abscess of the liver or from amoebic appendicitis. They have disclosed 18 cases ; in 14 the diagnosis was certain, in 4 there was strong presumptive evidence amounting almost to certainty. Peritonitis without perforation was rare ; it occurred four times, twice with localized and twice with generalized peritonitis. In 5 of the 18 cases the peritonitis was local, in 13 it was general. Of the 14 cases the perforation was single in 10, multiple in 4 ; as regards site, in 8 it was in the ascending colon, in 5 in the sigmoid, in 4 in the descending colon and in one in the transverse colon. Among the 14 " certain " cases perforation with localized peritonitis occurred in 3 only, with generalized peritonitis in eleven. From the clinical aspect the onset may be acute (there were 7 of these), or gradual, or it may be masked by the presence of some concomitant condition ; thus, in one the patient had a suppurative parotitis, in another a hepatic abscess, in a third a double pneumonia ; there were six such masked cases. Diagnosis may be obscure and in some cases is only made at operation or even at autopsy ; prognosis is very grave, the majority are fatal unless the diagnosis is made early and the peritonitis localized.

H. Harold Scott

BLANC, François & SIGUIER, Fred. **L'amibiase. Etude clinique et thérapeutique.**

This book is reviewed on p. 217.

LEONHARDT, H. Amöbeninfektion der Harnwege. [**Amoebic Infection of the Urinary Tract.**] *Ztschr. f. Hyg. u. Infektionskr.* 1950, July 26, v. 131, No. 4, 364–70. [11 refs.]

The greater part of this paper consists of a textbook account of the morphology and life-history of *Entamoeba histolytica* and therefore does not call for a detailed review. The clinical appearances are given of a case of amoebic cysto-pyelitis in a prisoner of war in Georgia (S. Russia) in 1945. The organism found in the urine was possessed of active movements : the description of it is far from satisfactory. Erythrophagocytosis was not observed and it contained no less than eight nuclei. The symptoms reacted favourably to Yatren therapy by the mouth.

P. Manson-Bahr

BUCCO, G. Sulla localizzazione dell' *Entamoeba histolytica* nelle vie urinarie. [**Localization of *Entamoeba histolytica* in the Urinary Tract.**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1950, July, v. 31, No. 7, 477–500. [118 refs.]

The English summary appended to the paper is as follows :—

" The author, who has observed a case of cystitis with cysts of Entamoeba histolytica in the urine, discusses the problem of urinary amoebiasis by E.h.

" After a critical review of the numerous reports made by ancient and modern authors, on the basis of the clinical and experimental observations, particularly on the basis of personal researches which demonstrated that the action of some constituents of urine, *i.e.*, urea and ammonia, is lethal to the protozoon, the author concludes that, when E.h. has originated a case of urinary amoebiasis, its presence in the urinary tract must be considered as correlated

to a vesico-intestinal fistula, or to the opening of an abscess of the liver in the urinary tract or to a process of the walls of the urinary system by metastatic extension from the intestine via the blood or lymphatic channels ; amoebae gaining direct access via the urethra may produce lesions of the urinary system only exceptionally."

GHOSH, S. M. & MUKHERJI, A. **Cutaneous Amoebiasis with a Case Report.** *Indian Med. Gaz.* 1950, Aug., v. 85, No. 8, 339–42, 4 figs. (2 on pl.) [19 refs.]

Two views are given to explain the penetration of *E. histolytica* into the tissues : (1) penetration is effected by the mechanical action of the blade-like pseudopodia extruded by the amoebae, or (2) the parasite acts directly on the tissues by means of a proteolytic ferment which dissolves the cells. The rôle of bacteria in the actual production of the ulcer is of secondary importance.

The case reported occurred in an Indian male, aged 42, complaining of a painful perianal ulcerative growth accompanied by pruritus. A biopsy report of ingrowths of papillary processes, in places with suggestion of cell-nest formation, pointed to a possible squamous-cell carcinoma. The growth was therefore excised after a preliminary inguinal colostomy. In about three weeks, the growth had disappeared and was succeeded by a granuloma on the abdominal wall near to the proximal opening of the colostomy. No ulceration of the mucous membrane of the gut could be discerned.

By biopsy of the granulomatous tissue, numbers of *E. histolytica* could be demonstrated, while scrapings from the surface of the granuloma also revealed them. No evidence of malignancy was found.

Treatment with emetine and chiniofon was at once instituted and after four injections of the former the granuloma disappeared completely ; the colostomy was closed later.

Emphasis is laid upon the resemblance of amoebic lesions in this case to carcinoma. *P. Manson-Bahr*

KOSHY, P. **Amoebic Abscess of the Brain.** *Indian Med. Gaz.* 1950, July, v. 85, No. 7, 287–8, 2 figs. on pl. [11 refs.]

The patient was admitted to hospital in Vellore, India, with ascites and oedema of the legs and a history of blood and mucus in the stools and occasional fever with chills.

There was no leucocytosis and no amoebae or cysts were present in the stools, which showed a preponderance of macrophage cells. Shortly afterwards paracentesis of the abdomen yielded 5½ pints of straw-coloured fluid. Finally death followed a series of Jacksonian epileptic fits. At autopsy typical amoebic ulcers were present in the caecum and colon while in the brain there was an area of haemorrhage and softening in the lower part of the left frontal lobe, about 5 cm. in diameter. The affected part was gelatinous with typical " red currant jelly " appearance. On microscopic section there was haemorrhage and necrosis and amoebae at the edge.

It is possible that the paravertebral plexus of veins may be the source of spread to the brain in the rare cases of isolated metastatic brain abscesses complicating amoebic dysentery. The case is illustrated by a photograph and a photomicrograph of the brain lesion. *P. Manson-Bahr*

FAUST, E. C. Algunos conceptos modernos sobre el diagnostico y tratamiento de la amebiasis. [**Some Modern Conceptions of the Diagnosis and Treatment of Amoebiasis.**] *Rev. Med. Chile.* 1950, Aug., v. 78, No. 8, 493–503. [55 refs.]

A general review.

HILLEMAND, P. & ROSENSTIEL. La place des médications iodées dans le traitement de l'amibiase. [**The Place of Iodized Compounds in the Treatment of Amoebiasis.**] *Maroc Méd.* 1950, July, v. 29, No. 302, 623–5.

Though emetine is the drug of choice in the treatment of acute amoebiasis and of extra-intestinal amoebiasis, additional treatment is sometimes necessary. Among the drugs available for this are the Holarrhena [kurchi] derivatives and the iodized compounds.

Yatren [chiniofon] was first advocated for the treatment of intestinal amoebiasis in 1921 by MÜHLENS and MENK [this *Bulletin*, 1922, v. 19, 31]; about the same time "Mixiode" and "Rexiode", of similar constitution, were produced in France. These iodized compounds have the disadvantage that when given by mouth they may cause diarrhoea; initially they were adopted for the treatment of amoebiasis with excessive enthusiasm, and it was even suggested they would replace emetine—a situation paralleled by the excessive claims recently made for the drug conessine. However useful such drugs may have proved, none has supplanted emetine.

The amoebicidal action of the iodized compounds is related to their iodine content in the form of oxyquinoline sulphate; the American diodoquin, one of the latest of them, contains 63·9 per cent. of iodine; it is free from toxicity, being passed in the stools without absorption from the gut; the only side-effect attending its use is pruritus ani. The American product is put up in capsules containing 0·16 gm. of the active product, the French ("Direxiode") in tablets containing 0·21 gm.

The doses of diodoquin, or its equivalent, advocated by various workers vary greatly; the classical treatment extends over twenty days, and consists of 10 tablets daily, 3 in the morning, 3 at noon, and 4 in the afternoon, after meals (2·1 gm. daily). The authors recommend treatment over 30 days in this dosage; and this treatment repeated on several occasions, with intermissions of 10 to 15 days, cured 5 cases of rapidly relapsing amoebic dysentery. The first course of treatment in all 5 cases was followed by complete disappearance of intestinal symptoms; after the third course parasites had completely vanished from the stools. Acute cases of amoebiasis were not treated with the drug, as the results of others in such cases were poor. In 11 mild cases of amoebiasis with relapses at long intervals two courses of treatment produced clinical and parasitological cure. Symptomless cyst carriers appeared more refractory to treatment with diodoquin; and four cases treated were not sterilized of their infections. On first trial the French preparation gave results inferior to those obtained with the American; but when more soluble tablets of Direxiode were made the results were strictly comparable.

Recently a new iodized preparation has become available; this is "Protistene" [described as *un dérivé disodique de l'àcide* 3′5″ 3′5″ *tetraiodo* 4′4″ *dioxytriphényl méthyl carboxylique* 2.]. It is put up in cachets of 0·75 gm., with the addition of 0·002 gm. of "belladonna powder." The dosage for an adult is 5 cachets of Protistene on the 1st to the 5th days of treatment; these are taken during the evening meal, which is rich in fat and diminishes the nausea due to the drug. This compound gives good results in chronic amoebiasis, and it also seems to exert an action against *Giardia*, *Trichomonas* and *Enteromonas*. If it is given in excessive doses it causes violent colic; the belladonna diminishes the risk of this.

In the treatment of acute amoebiasis, emetine retains its pride of place. The iodized preparations may be given to complete the action of emetine, and they are useful when emetine needs to be stopped on account of toxic manifestations. The treatment recommended for acute amoebiasis is 2 intramuscular injections of emetine, one of 0·02 gm. and the other of 0·04 gm., on the first day; on the

second day 2 injections, each of 0·04 gm.; on the 3rd day 2 injections, of 0·06 and 0·02 gm.; and thereafter a daily injection of 0·08 gm., which on the 8th day is increased to 0·1 gm. Over a period of 12 days a total dosage of 0·68 gm. of emetine is given to a man of 65 to 70 kgm. After the 4th day of treatment diodoquin is given daily for 20 or 30 days; and after a break of 8 days the drug is repeated for another 20 days. During the course of the following 3 years these courses of treatment with diodoquin must be repeated according to the clinical indications.

Chronic amoebiasis is treated with diodoquin alone; emetine is not advised in these cases. Cyst carriers are similarly treated. In the treatment of cases of extra-intestinal amoebiasis emetine is without equal. *A. R. D. Adams*

CAMBIES, J. Nouvelle méthode de traitement de l'amibiase. Le cycle entéro-hépatique de l'amibe et le rôle de l'excrétion vésiculaire provoquée. [**A New Method of Treating Amoebiasis. The Entero-hepatic Cycle of the Amoeba and the Rôle of Induced Biliary Secretion.**] *Maroc Méd.* 1950, July, v. 29, No. 302, 626–9.

The recent war has caused an increase in the number of cases of amoebiasis, especially of those cases presenting unusual manifestations. Before 1914 amoebiasis was essentially a tropical condition, after the 1914–18 war it became much more generalized, and since the recent war it has become universal in distribution. It must now be considered as a possible cause of any undiagnosed digestive disorder.

After consideration of the life cycle, biology, and pathogeny of the dysentery amoeba the author states that a drug which is concentrated in the localities normally favoured by the parasite (the liver and the intestine) would rationally be best suited to its eradication. He considers the *sel disodique de l'acide 3′5″ 3′5″ tetraiodo 4′4″ dioxytriphényl méthyl carboxylique* 2 [Protistene], given with a fatty diet to promote biliary secretion, to meet the requirements. [The description of the salt "Protistene" in the above two papers is inconsistent. In the absence of a structural formula it cannot be stated what description is correct: but in a trade advertisement for Protistene in the same number of *Maroc Médical* it is described as 3′ 5′ 3″ 5″ *tetraiodo* 4′4″ *dioxytriphenylmethyl-carboxylique* 2.] *A. R. D. Adams*

BERBERIAN, D. A., DENNIS, E. W. & PIPKIN, C. A. **The Effectiveness of Bismuthoxy *p*-N-Glycolylarsanilate (Milibis) in the Treatment of Intestinal Amebiasis.** *Amer. J. Trop. Med.* 1950, Sept., v. 30, No. 5, 613–23, [17 refs.]

After a general account of Milibis (Win 1011) (bismuthoxy *p*-N-glycolyl-arsanilate), first synthesized in Germany and marketed there under the name of Wia, and of its toxicity in man and in animals and its amoebicidal potency *in vitro* and *in vivo*, the authors record the results of a study of its efficacy, in comparison with chiniofon, in the treatment of intestinal amoebiasis at Beirut, Lebanon. They used the following:—Milibis put up in tablets of 0·25 gm. for oral administration; chiniofon in tablets of 0·25 gm.; a chiniofon-Milibis mixture in 0·5 gm. tablets, containing equal amounts (0·25 gm.) of each drug; a chiniofon (0·13 gm.)-bismuth subgallate mixture in 0·25 gm. tablets; and 0·25 gm. tablets of bismuth subgallate. They treated 94 patients, with microscopically proven intestinal *Entamoeba histolytica* infections, with one or other or a combination of these tablets. The daily dosage with any one of the drugs was 1·5 gm. and this was continued for seven days. The sex and age groups to which the patients belonged, their symptoms, and the details of the various

courses of treatment are set forth in tables. Stool examinations after treatment were continued over periods of 35 to 543 days, the average being 10 specimens examined over 287 days. Milibis treatment for one week freed 62 (92·6 per cent.) of 67 patients of their amoebiasis ; chiniofon freed 15 (47 per cent.) of 32 patients, and 16 of these who relapsed were cured by retreatment with Milibis. Milibis is therefore twice as effective as chiniofon in the treatment of amoebiasis ; a combination of the two permanently cleared 23 (92 per cent.) of 25 patients so treated. The addition of bismuth subgallate to either Milibis or to chiniofon possibly increased the cure rate of each, but the number of cases treated is inadequate to prove this. Milibis is easy to administer, was found devoid of toxicity, was clinically efficacious in the treatment of chronic intestinal amoebiasis, and also seems to have eradicated a substantial proportion of infections with *Iodamoeba williamsi* [*sic*], *E. coli*, *Endolimax nana*, and *Chilomastix mesnili*. It has little effect on *Giardia intestinalis*. [See also this *Bulletin*, 1950, v. 47, 1199.] *A. R. D. Adams*

HALAWANI, A., ABDALLAH, A. & EL KORDY, M. I. **Aureomycin in Intestinal Amoebiasis. A Preliminary Report.** *J. Roy. Egyptian Med. Ass.* 1950, v. 33, No. 7, 701–8.

Aureomycin was given by mouth to two series of patients with chronic relapsing intestinal amoebiasis.

The authors give the following summary :—

" 1. Seven cases of intestinal amoebiasis were treated with 500 mg. doses of Aureomycin every six hours for seven consecutive days, a total dose of fourteen grammes being administered. Five of the cases suffered from parasitic and clinical relapses within a period of forty days after treatment.

" 2. Five similar patients received the same dose of Aureomycin for ten days, *i.e.*, a total dose of 20 gm. In two cases parasitic relapses occurred within the same period of observation, but no clinical relapses were noted.

" 3. The remaining five cases were still asymptomatic and their stools free from *E. histolytica* at the end of the period of observation.

" 4. No serious toxic effects were encountered in any case."

A. R. D. Adams

SIGUIER, F., PIETTE, M., CHOUBRAC, P. & HERMAN, J. M. Note préliminaire sur l'intérêt thérapeutique de l'auréomycine au cours de certaines amibiases intestinales évolutives. [**Preliminary Note on Therapeutic Trials with Aureomycin in Intestinal Amoebiasis of Considerable Duration.**] *Bull. Soc. Path. Exot.* 1950, v. 43, Nos. 7/8, 419–21.

A preliminary note is given of a trial of aureomycin in cases of severe intestinal amoebiasis of considerable duration in patients repatriated from Indo-China. The dosage was 1·5 gm. (in 6 doses) on the first day and then 3 gm. daily for 7 to 10 days (a total at least of 20 to 25 gm.). The immediate clinical results were good, and haematophagous amoebae disappeared from the stools. It seemed as if aureomycin was actively amoebicidal. *A. R. D. Adams*

NEGHME, A. & SILVA, R. Isosporosis humana (relato de un caso observado en Santiago). [**A Case of Isosporosis in Man in Santiago (Chile).**] *Bol. Informaciones Parasitarias Chilenas.* 1950, July–Sept., v. 5, No. 3, 31–2.

The English summary appended to the paper is as follows :—

" The authors report the finding of *Isospora belli* Wenyon 1923 in one patient suffering from diarrhoea."

AGOSIN, M., CHRISTEN, R. & RUBIO, M. Acción de la aureomicina sobre el *Balantidium coli*. 1. Estudio " in vitro ". [*In Vitro* **Study of the Action of Aureomycin on** *Balantidium coli*.] *Bol. Informaciones Parasitarias Chilenas*. 1950, July–Sept., v. 5, No. 3, 32–3.

The English summary appended to the paper is as follows :—

" Aureomycin has an unfavorable effect upon the development and multiplication of *B. coli*, when applied in the given dosage.

" This action seems to be direct upon the parasite, and not by modification of the added microscopic flora."

RELAPSING FEVER AND OTHER SPIROCHAETOSES

DURIEUX, C. & BOIRON, H. Sur l'infection spontanée de la souris grise par le spirochète récurrent dakarois. [**On the Spontaneous Infection of Wild Mice with the Dakar Relapsing Fever Spirochaete.**] *Bull. Soc. Path. Exot.* 1950, v. 43, Nos. 7/8, 403–6.

MATHIS [this *Bulletin*, 1928, v. 25, 587] showed that the mouse is susceptible to infection with the organism of Dakar relapsing fever, a spirochaete resembling *S. duttoni*, but an attempt, with DURIEUX, to find the infection in the blood of wild mice was negative [this *Bulletin*, 1934, v. 31, 505]. During the year 1st March 1949 to 1st March 1950, 569 wild mice (*Mus musculus*) caught at Dakar have been examined and spirochaetes found 4 times as a result of direct blood examination. In addition, out of 432 tested by blood inoculation, 7 were positive ; and of 414 in which the liver and brain were inoculated, 12 showed spirochaetes. Eleven of these infected mice came from the European part of Dakar, where conditions are more favourable for the presence of ticks (*Ornithodorus*) than the native town, where only one infected mouse was found. The infection rate of the Dakar wild mice by spirochaetes thus works out at 2·8 per cent. *E. Hindle*

GRÜN, H. Die experimentelle Übertragung von Rückfallfieber-Spirochäten durch *Ornithodorus moubata*. [**The Experimental Transmission of Relapsing Fever Spirochaetes by** *O. moubata*.] *Ztschr. f. Hyg. u. Infektionskr.* 1950, July 9, v. 131, Nos. 2/3, 198–218. [42 refs.]

The author reviews the literature on the subject with special reference to the three ways in which an infected tick may transmit the infection, viz. :—(1) by means of the salivary secretion ; (2) by the entry of other glandular secretions ; (3) by the entry of faeces into the wound through the agency of the coxal gland secretion.

Two strains were employed in the author's first experiments, *Spirochaeta duttoni* and *S. recurrentis*, both of which had lost their pathogenicity to man as a result of numerous animal passages. Neither of these strains could be transmitted by the bites of *Ornithodorus moubata*. Nymphs were fed on heavily infected mice and subsequently after varying intervals on normal rats, with negative results. In the case of *S. duttoni*, spirochaetes could be seen in the gut up to the 7th day but not after the 11th day, and the inoculation of the contents into rats failed to give any definite infection, though the results of immunity

tests were a little uncertain. A strain of *S. recurrentis* which had undergone about 4,800 passages in mice could not be transmitted by the bites of *Ornithodorus moubata*, but the spirochaetes retained their virulence inside the tick for a period of at least six weeks as tested by inoculation into rats. This suggests a more economical method of maintaining strains of *S. recurrentis*, than passage in rats or mice.

Experiments were then made with a strain of *S. hispanica*, still pathogenic to man, and it was found to be easily transmissible by *Ornithodorus moubata*. Infection was produced both by the bites of infected ticks, and also by the inoculation of the coxal fluid. Occasionally, however, transmission did not take place even with ticks that were shown to be infectious in subsequent feeding experiments. Also infection could be produced even when the coxal fluid was negative.

Spirochaetes were transmitted to the offspring of infected ticks but not to the third generation, and it would seem that the hereditary transmission depends on a variety of circumstances. Theoretically it should be possible for an infected male to transmit the infection by means of the contents of its spermatophore, but the only experiment gave negative results, and spirochaetes could not be found in the spermatophore.

The author finds that nymphs are the most important transmitting agents, not only because of their small size, but also because their salivary glands are relatively better developed and more easily invaded by the spirochaetes. Males usually feed badly and in females the sex organs are most heavily infected. In older ticks the salivary glands tend to atrophy. *E. Hindle*

HEISCH, R. B. **On *Spirochaeta dipodilli* sp. nov., a Parasite of Pygmy Gerbils (*Dipodillus* sp.).** *Ann. Trop. Med. & Parasit.* 1950, Oct., v. 44, No. 3, 260–72, 2 text figs. & 2 figs. on pl. [20 refs.]

"1. A spirochaete, *S. dipodilli* sp. nov., was isolated from pygmy gerbils (*Dipodillus* sp.) from Crescent Island and the east shore of Lake Naivasha in Kenya.

"2. The natural vector is *Ornithodoros erraticus*.

"3. The spirochaete was with difficulty transmitted by *O. moubata*, *O. savignyi* and an Iranian strain of *O. erraticus*, occult infections being caused in experimental animals. *Pediculus corporis* and *Pedicinus longiceps* were also infected, and metacyclic spirochaetes were observed in a human louse.

"4. The organism is pathogenic to rats, mice, monkeys and young rabbits, but not to guinea-pigs. Man is only mildly susceptible.

"5. There is no cross-immunity against strains of *S. duttoni*, *S. harveyi*, *S. turicatae*, *S. crocidurae*, *S. merionesi* and *S. microti*."

BALTAZARD, M., BAHMANYAR, M. & SAFAVI, G. Sur les différences de taille observées chez l'*Ornithodorus erraticus*. [**On Differences in Size observed in *O. erraticus*.**] *Bull. Soc. Path. Exot.* 1950, v. 43, Nos. 7/8, 444–9, 2 figs. on pl.

The author finds constant differences in size between the strains of *O. erraticus* from the coast of North Africa, and those from South Morocco and Persia, even when they were reared in the laboratory under similar conditions. It is suggested that they may constitute two different species. Detailed average measurements and photographs of different specimens are given. *E. Hindle*

FLOCH, H., CONSTANT, Y. & DESTOMBES, P. Sur le sodoku en Guyane française et son traitement par la streptomycine. [**A Case of Rat-Bite Fever in French Guiana and its Treatment by Streptomycin.**] *Bull. Soc. Path. Exot.* 1950, v. 43, Nos. 7/8, 406–10, 2 figs.

Rat-bite fever has not previously been reported from French Guiana and only a single case has been reported from the adjoining territories of Dutch Guiana and British Guiana.

The subject of this report presented the usual symptoms of rat-bite fever 13 days after having been bitten by a rat, but the nature of the eruption was unusual and not only the axillary lymph nodes but also the submaxillary nodes were enlarged. Numerous spirilla were found in blood of white mice inoculated with blood from the patient 14 days previously and they were also demonstrated in the patient's blood 35 days after infection.

Serological tests for syphilis remained negative throughout the course of the illness.

Treatment with 1 gm. of streptomycin daily for 10 days resulted in rapid and complete cure. *P. A. Clearkin*

YAWS

REIN, C. R., KITCHEN, D. K. & PÉTRUS, E. A. **Repository Penicillin Therapy of Yaws in the Haitian Peasant. A Clinical and Serologic Survey.** *J. Investigative Dermat.* 1950, Apr., v. 14, No. 4, 239–45. [35 refs.]

It is estimated that 80 per cent. of the rural population of Haiti is infected with yaws. "The health and economy of the Haitian people is constantly threatened by a triad of diseases: malaria, hookworm and yaws. Of these, yaws is the most virulent and the most common and when the disease remains untreated it produces crippling and a painfully loathsome disfigurement of its victims."

This paper, read in Atlantic City in June 1949, reports the use of penicillin G in arachis oil containing 4·8 per cent. beeswax (Romansky formula) in total doses of 1·2 mega units of penicillin as a daily injection for 4 days (Group A) or twice daily for 2 days (Group B), and of 2·4 mega units in doses twice a day for 2 days (Group C). The numbers in the three groups were 450, 492, 258 respectively, and 60–70 per cent. of cases were followed up for at least 12 months. "Only those patients with early yaws were selected for this study". Over 2,000 contacts of these cases with latent or tertiary yaws were also treated to reduce the risk of reinfection. The serological results of treatment were followed by the standard and quantitative Kahn tests.

In the following table "serological cure" means that the serum became negative and remained so during observation; "serological improvement" indicates a reduction in titre only. In 5–10 per cent. of cases there was no reduction in Kahn titre below pre-treatment levels. There were 1–3 serological relapses in each group.

There were no recognized reinfections or clinical relapses. The authors conclude that the 2·4 mega units in 4 days gave the best results. They expect further "serological cures" with the passage of time.

The clinical effect of the treatment commenced by the time the second injection was given when the patient "felt much better", and headaches and

Groups	Serological cure (i)	Serological improvement (ii)	i plus ii per cent.	Clinical cure per cent.	Totals observed for 12 months
A	115 (37 per cent.)	173 (55 per cent.)	92	95	312
B	122 (39 per cent.)	163 (52 per cent.)	91	94	314
C	79 (49 per cent.)	73 (45 per cent.)	94	98	161

joint pains had gone. Secondary skin lesions were usually healed within 4 days presumably from the beginning of treatment] and all lesions had healed within 3 months. These results were better than those which followed sodium penicillin in aqueous solution or calcium penicillin in arachis oil and beeswax previously reported by DWINELLE *et al.* and by REIN *et al.* (*J. Nat. Med. Ass.*, 1949, v. 41, 60) [see this *Bulletin*, 1948, v. 45, 87 ; 1949, v. 46, 551].

The authors regard the clinical response of early yaws to penicillin as uniformly and invariably excellent but note that the serological response is much slower and less satisfactory than in early syphilis similarly treated. The authors say that procaine penicillin in oil with aluminium monostearate has largely replaced penicillin in oil with beeswax, and feel that a single injection of 0·3–1·2 mega units of penicillin may possibly give results as good as those reported here. *C. J. Hackett*

TAVARES, A. Ação terapêutica da penicilína-G-procaina em boubentos que comparacem aos ambulatorios especializados. [**Outpatient Treatment of Yaws with Procaine-Penicillin G.**] *Med. Cirurg. Farmacia.* 1950, Sept., No. 173, 418–26.

A record of the results of treatment of yaws patients in Brazil with procaine-penicillin shows that this antibiotic is superior to arsenicals. Seventy-five patients were treated as out-patients, of whom 33 were in the primary stage, 17 in the secondary, 10 mixed, 6 with transition lesions, 8 with plantar and palmar keratodermia and one in a late stage with pseudo-gumma. In a table are given the form and stage of each, the dosage and length of treatment, and the results. These may be summed up by saying that 30 improved in (an average of) 15·96 days and 40 were cured in (an average of) 27·12 days. In five there is no information. The average dose of those who improved was a total of 468,333 units of penicillin and of those cured 921,250 units.

Twenty-five more advanced and more severe cases were taken into hospital for treatment. Of these only 10 were cured, in an average time of 44·4 days and an average total dosage of 3,090,000 units ; 15 improved in an average of 49·2 days and with a total dosage of 3,073,333 units ; several of this group had late lesions.

In his summing up the author states that the treponemata were not found 6 days after treatment was begun ; that cure of those in the early stages was effected in 27 days and in late cases in 61 days, whereas arsenicals took 168 days. *H. Harold Scott*

LINS, S. A., GUIMARÃES, F. N., VASCONCELLOS, P. & MIRANDA, J. L. Acção da aureomicina no tratamento da bouba (Framboesia, Pian, Yaws). [**Aureomycin in the Treatment of Yaws.**] *Rev. Brasileira Med.* Rio de Janeiro. 1950, July, v. 7, No. 7, 439–42, 5 figs. English summary.

After referring to literature on the treatment of other spirochaetoses—Weil's disease, syphilis and pinta—the authors record two cases of yaws, one in a child of a year, the other in an adolescent of 16 years, treated with aureomycin. The first was in a bad state ; a photograph shows an infant with a very large number of sores. Aureomycin was given orally, in slices of banana, in doses of 50 mgm. every 4 hours for 15 days, a total of 4·5 gm. The only sign of intolerance was diarrhoea coming on 16 hours after the treatment was started and continuing intermittently until the sixth day. Treponemata were not seen in the lesions after 48 hours. Photographs show a very marked reduction of the lesions in 4 days, and disappearance, except for residual staining, by the end of the course.

The other patient had previously had penicillin ineffectually. She had lesions of abdomen, axillae, thighs and buttocks. She was given aureomycin *per os* in doses of 250 mgm. at intervals of 3½ hours, 6 doses daily, cutting out the night doses, for 16 days, a total of 24 gm. No treponemata were found in the lesions after 48 hours, but the lesions receded more slowly than in the first patient, and the Wassermann and Kahn reactions remained strongly positive.

H. Harold Scott

LEPROSY

LEPROSY IN INDIA. 1950, July, v. 22, No. 3, 150–61. **Annual Report for 1949 of the Indian Council of the British Empire Leprosy Relief Association** [MEHTA, J. N., Chairman].

INNES, J. R. **Leprosy in Uganda. A Survey in the Kigezi District.** *East African Med. J.* 1950, July, v. 27, No. 7, 278–83.

This survey is of interest because it is in the area of the Lake Bunyoni Leprosy Settlement, founded 30 years ago, and now isolating and treating 800 patients. In all, 91,964 persons were examined in samples at 34 places and 563 cases of leprosy were found, or 6·1 per thousand, an estimate of 2,500 cases in the district outside the asylum. " Strong indications were found of the effective degree of control that has been exercised in the past by the Lake Bunyoni Leprosarium to the extent of reducing the incidence of leprosy ", for only a moderate incidence was found. Nevertheless the general conditions are similar to those of comparable parts of East Africa with a leprosy incidence found by other completed surveys reviewed in this *Bulletin* varying from 10·2 to 14·3 per mille and total estimates in East Africa of 195,210 cases, or 15·2 per mille. An analysis of the cases found in the survey showed 21 per cent. up to the age of 14 ; lepromatous cases were 19·7 per cent. of the whole and mild tuberculoid cases about 30 per cent. Furthermore 74 per cent., mostly children, lived in home contact. Dr. Innes testifies to the " incalculable " saving of new infections due to the " curative and segregation work " of the Lake Bunyoni leprosarium, which he considers has reduced the incidence of leprosy in the district from 25–30 per thousand to 6·1 per thousand.

L. Rogers

WHEATE, H. W. **An Intensive Leprosy Survey in Teso District, Uganda.** *East African Med. J.* 1950, July, v. 27, No. 7, 274–7.

This note deals with an area of Uganda which is served by the Leprosy Settlements of Kumi and Ongino and is concerned with the examination of nearly 600 people or about 85 per cent. of the population. A high proportion of them suffer from syphilis, and malaria is hyperendemic. Among a population of 592 persons 19 cases were found, or 32·1 per thousand, with an excess in males. No lepromatous cases were found and nearly all were of the mild tuberculoid type ; so the incidence of leprosy around the settlements is probably less than that of the district and is likely to fall further. *L. Rogers*

CHUNG-HOON, E. K. **Hansen's Disease in Hawaii, 1939–1949.** *Hawaii Med. J.* 1950, May–June, v. 9, No. 5, 305–9, 5 graphs.

This is an instructive account of leprosy in Hawaii in 1939–49. After a summary of the well-known history of the "Chinese Disease" in Hawaii the following recent data are recorded. During the 10 years, an average of 32 cases was reported. Hawaiians and Filipinos account for 48 per cent. of the cases, with twice as many cases in males as in females, and 33 per cent. under 20 years of age. Histories of the disease of 12 months' duration or less were given in 78 per cent. and in only 7 per cent. was there a history of over 5 years ; indications are present that the disease is being diagnosed much earlier than formerly. In the whole period of ten years 61 per cent. of new cases were positive bacteriologically, but the proportion is falling. Among new cases during the last five years 14 per cent. were "indeterminate", 45 per cent. tuberculoid and 41 per cent. lepromatous ; the lepromatous type was more frequent in males (63 per cent.) and the indeterminate type occurred predominantly in males (75 per cent.). Deaths decreased and discharges increased during the last five years : deaths were 87 per cent. in 1939–44 and 72 per cent. in 1945–49 ; the corresponding figures for discharges were 12 and 22 per cent. Progress is thus being made. *L. Rogers*

BUCCO, G. La fine struttura del reticolo precollageno nel granuloma leproso. [**The Histological Structure of the Leproma.**] *Acta Med. Italica.* 1950, Sept., v. 5, No. 9, 307–14, 5 figs. [19 refs.] English summary.

The author describes the development of the pre-collagenous reticular structure of leprous granulomata, showing how at first it increases almost *pari passu*, but later, if retrograde processes supervene, the fibrils of the reticulum become more and more slender and break up. If, however, the granuloma becomes denser the reticular fibres increase in size and blend with the surrounding connective tissue. The histological processes are shown in a series of photomicrographs. *H. Harold Scott*

BARNETSON, J. **Osseous Changes in Neural Leprosy. Radiological Findings.** *Acta Radiologica.* 1950, July–Aug., v. 34, Nos. 1/2, 47–56, 33 figs.

These cases are of interest from the clear X-ray appearances, which show in early cases notching and atrophy of the tufts of the terminal phalanges going on to steadily increasing absorption until only the base remains. The changes are similar in the bones of the hands and feet, but atrophy is usually more advanced in the feet ; they are bilateral, but rarely truly symmetrical. In advanced cases osseous atrophy extends to all the phalanges, the metatarsals and may rarely affect the metacarpals ; osteosclerosis and sequestrum formation were rare in the absence of secondary infection. Much deformity was produced.

Diffuse osteoporosis occasionally occurred. Joint involvement was usually associated with infection. The paper is illustrated with 33 excellent radiographs.

L. Rogers

BARNETSON, J. **Osseous Changes in Neural Leprosy. Correlation between Histopathological and Radiological Findings.** *Acta Radiologica.* 1950, July–Aug., v. 34, Nos. 1/2, 57–64, 11 figs.

In this paper the correlation between the radiological and the histopathological findings on the osseous changes in neural leprosy is dealt with, based on the findings in feet removed at autopsy or amputated. In early cases the phalanges showed gaps filled with connective tissue continuous with the periosteum and marrow. Osteoclasts were rarely found possibly on account of the chronicity of the process. In very advanced cases, cancellous tissue had frequently disappeared and the thick cortical bone enclosed a narrow medullary cavity containing fibrous tissue. Details of the five cases are recorded. When diffuse osteoporosis is seen by X-rays in advanced cases the cortical bone is narrowed and osteoporosis activity may be found : concentric atrophy and absorption of cancellous bone occurs. The cause of the myxomatous and fibrous changes of the bone marrow which apparently increases in extent of bone change is not at present known. The bone changes are well shown in 11 illustrations.

L. Rogers

SHIVELY, J. A. & KUHNS, D. M. **Evaluation of Cardiolipin Antigen in the Tests for Syphilis in Leprosy.** *Internat. J. Leprosy.* New Orleans. 1950, Apr.–June, v. 18, No. 2, 169–75. [17 refs.]

These authors submitted 150 sera from 142 presumably non-syphilitic patients suffering from leprosy [types not stated] to the following tests : (1) Kahn standard (2) Kolmer complement fixation test (C.F.T.) with the use of Kolmer antigen (3) Kolmer C.F.T. with cardiolipin antigen (cardiolipin 0·0175, lecithin 0·0875 and cholesterol 0·3 per cent.) and (4) a cardiolipin microflocculation test. All of the patients had previously given positive or doubtful results with standard tests and most of them had received sulphone treatment. Twenty-two sera proved anticomplementary ; in the 120 cases remaining the Kahn reaction was positive or doubtful in 90 (75·0 per cent.), the Kolmer C.F.T. in 64 (53·3 per cent.), the Kolmer C.F.T. with cardiolipin antigen in 44 (36·6 per cent.) and the cardiolipin flocculation test in 70 (58·3 per cent.).

Fourteen sera were positive and 13 negative with all tests ; the eight sera which were tested twice revealed no definite pattern.

From the above it appears that the cardiolipin C.F.T. is the most specific test ; the fact that only 14 sera gave positive reactions with all tests suggests that the group of patients did not include a high proportion of cases of asymptomatic syphilis.

[Some forms of leprosy are more liable to give false positive reactions than others ; this and the fact that many of the patients had received treatment indicate that the percentages of false positive reactions recorded above are relative and not absolute.]

T. E. Osmond

LIPPI, M. Le reazioni di Takata-Ara, di Takata-Damhoto e la bilirubinemia nella lepra. [**The Takata-Ara and Takata-Damhoto Reactions and Estimation of Bilirubinaemia in Leprosy.**] *Arch. Ital. Sci. Med. Trop. y Parassit.* 1950, July, v. 31, No. 7, 520–23.

The English summary appended to the paper is as follows :—

" Tests were carried out with the Takata-Ara reaction, the Takata-Dhomoto shown in title as Damhoto] reaction, and the bilirubin content on 18 persons

affected by Leprosis in its various clinical forms. The results were normal in 14 cases, whereas the Takata reaction proved to be slightly positive in 4 cases."

DHARMENDRA & CHATTERJI, S. N. **Lesions simulating Leprosy caused by a Stab Wound in the Thigh.** *Leprosy in India.* 1950, July, v. 22, No. 3, 162–3, 3 figs. on pl.

This illustrated paper deals with a patient presenting anaesthesia and muscular atrophy of lower part of the left leg and of the foot with a trophic ulcer under the heel, which suggested damage to the sciatic nerve. Careful examination and the presence of a scar in the thigh led to leprosy being excluded.

L. Rogers

DHARMENDRA. **The Present Status of Sulphones in the Treatment of Leprosy.** *Indian Med. Gaz.* 1950, Aug., v. 85, No. 8, 348–61. [63 refs.]

This paper gives a valuable summary of recent work on this subject, from the study of which the author comes to the following conclusions. The rapid clinical improvement is accompanied by very slow bacteriological decrease ; this necessitates treatment for 5 or more years, but earlier decrease of lepra bacilli in the nose, throat and in ulcers decreases the infectivity considerably. The proprietary sulphone drugs cost nearly £19 a year per case, but this is much reduced by parenteral administration or the use of the parent compound, DDS, although this is more toxic and likely to precipitate undesirable reactions. All advanced lepromatous patients should be treated by sulphones for six months to a year, when they can revert to the hydnocarpus oil injections, wherever cost is a consideration, and with much reduced infectivity they may be discharged to make room for the urgent treatment of more highly infective cases, so as to obtain the maximum control of leprosy. *L. Rogers*

TOLENTINO, J. G. **Synergistic Action of Chaulmoogra and Sulfone Drugs.** *J. Philippine Med. Ass.* 1950, July, v. 26, No. 7, 315–18.

This paper deals with the important question of the comparative efficiency of chaulmoogra, sulphone, and chaulmoogra-sulphone in combination. The patients were allowed to choose their medicaments except for some restriction on the expensive sulphones. Purified chaulmoogra oil and iodized ethyl esters and diasone and promin were used in the usual doses. Only those who were able to receive at least half the prescribed doses were included in those considered to have been adequately treated and analysed in this paper. The clinical results showed improvement in 57 of 153 patients with chaulmoogra, 27 of 40 with sulphones and 14 of 33 with chaulmoogra-sulphone. The corresponding bacteriological improvements were, with chaulmoogra 66, sulphone 12 and chaulmoogra-sulphone 19. Thus the sulphones gave the best clinical, but the poorest bacteriological improvement while chaulmoogra-sulphone combination gave the best bacteriological improvement and better clinical improvement than chaulmoogra alone. In several cases leprous lesions markedly improved, or disappeared completely, but their bacteriological results remained strongly positive. Yet tuberculoid cases in the reaction stage may still show negative bacteriological findings. The conclusion is reached " that sulphone drugs give the best results in resolving leprous lesions, and that the chaulmoogra-sulphone combination produces the greatest bacteriological improvement." The author states that this is probably the first report of the more rapid bacteriological action of the two drugs in combination " in affecting more rapid bacteriological improvement than when either of the two drugs is used. Hence chaulmoogra

cannot yet be discarded as a useless antileprotic medicine, because its bacteriological effect cannot be surpassed by that of the sulphone drugs. On the contrary, there is evidence that it is far superior. Hope is still entertained that future observations will show that the sulphone-chaulmoogra combination will equal, if not surpass, the efficacy of the sulphone alone in affecting clinical cure."

L. Rogers

DHARMENDRA. **The Results of Sulphetrone Treatment of Leprosy in the Gobra Hospital, Calcutta.** *Leprosy in India.* 1950, Apr., v. 22, No. 2, 46–89, 16 figs. on 4 pls.

The author reports on the treatment with sulphetrone of 87 lepromatous patients at the Calcutta Gobra Leprosy hospital by oral and intramuscular injection. Treatment was continued for periods of 1 to 4 years and was controlled by blood and bacteriological examinations. Illustrations of cases before and after treatment show striking improvement. Intramuscular injections are far more economical, as a large amount of the oral dose is unabsorbed. One-fifth of the oral dose, when injected, produces the required concentration in the blood ; for this only 4 to 5 gm. or less a week suffices, against 36 gm. by the mouth. The drug can also be injected for the combined treatment in an emulsion of sulphetrone in hydnocarpus oil and water. A long series of tables is appended of cases under both methods of administration. Most of the cases were advanced.

Clinical improvement was similar to that obtained by other observers. Bacteriological progress was slow, but definite ; during three years only 4 patients became bacteriologically negative. Before treatment all but 6 were strongly positive ; under treatment 41 per cent. became only slightly or moderately positive in proportion to the duration of treatment. The results were slightly in favour of the combined treatment, but the author found that it might be better to inject sulphetrone and hydnocarpus oil separately. The improvement was slight in 8 patients, moderate in 13, much in 44 and marked in 21 cases ; patients in the last group being practically free of symptoms except early deformities. Considerable detail is provided in the original paper.

L. Rogers

DHARMENDRA, SEN, N. & CHATTERJI, S. N. **Treatment of Leprosy with Sulphetrone Injections in the Out-Patients.** *Leprosy in India.* 1950, July, v. 22, No. 3, 112–28.

A trial of small doses of sulphetrone, such as a maximum of 0·15 gm., as a 3·3 per cent. watery solution intramuscularly twice a week, has been tested in out-patients, and was reported by CHATTERJEE [this *Bulletin*, 1949, v. 46, 553]. In spite of the drug not being detected in the blood stream definite clinical improvement took place.

In the present study, the authors set out to study (1) the suitability of sulphetrone injections in out-patients, (2) their value in active "neural" cases, (3) the effectiveness of small doses of sulphetrone.

The drug was given intramuscularly as an aqueous solution, first at 60 per cent., diluted to 30 per cent. at the time of use, and later as a 50 per cent. solution which was not diluted. They gave the injections twice a week and used (*a*) a "smaller" dose 0·5 cc. (*i.e.*, 0·3 gm., later 0·25 gm.) and (*b*) a "bigger" dose, 0·5 cc., gradually increasing to 3 cc. (*i.e.*, 1·8 gm., later 1·5 gm.).

Altogether, 41 lepromatous and 15 neural cases were treated, 25 of whom had shown repeated lepra reactions and only temporary benefit on other treatments. Most of the patients have been under the sulphetrone for a year or so, and in the lepromatous ones no material bacteriological improvement has

been noted, but clinical improvement has resulted, tables of all the cases being given. With small initial doses the treatment is quite safe. In the " neural " type, in 13 of 15 tuberculoid cases clinical subsidence was much quicker than under hydnocarpus oil especially in reacting bacteriologically positive cases, the small doses are of use in treating reactions. Weekly dosage of 4 gm. in two doses is safe and adequate by intramuscular administration. It is finally recommended that the treatment should start with 1 cc., gradually increased to 4 cc., the injections being twice weekly. In cases of lepra reaction, 0·5 cc. should be given and the dose kept low. *L. Rogers*

PENNEC, J. La promine intra-dermique dans le traitement de la lèpre lépromateuse. [**Intradermal Injection of Promin in the Treatment of Lepromatous Leprosy.**] *Rev. Service Santé Publique Guadeloupe.* 1950, v. 1, No. 1, 9–13.

This note reports 16 cases in Guadeloupe in which promin was injected into the cutaneous lesions as used by HERRERA, with results that support, but do not equal, his. Thus in 50 per cent. of the cases the results were satisfying after six to eight weeks, especially when the lepromes were of recent origin, lesions on the nose responded best. The injections are not very painful, so they are worth trying. Brief details are given of all 16 cases. *L. Rogers*

MUIR, E. **Bacterioscopic Assessment of Progress in Leprosy.** *Leprosy in India.* 1950, Apr., v. 22, No. 2, 43–5.

In lepromatous leprosy clinical appearances are very deceptive and bacteriological examinations furnish the true criterion of progress in recovery. This is especially important in cases treated by sulphones. The examination of the skin and mucous membranes for this purpose is discussed in this note. Nodules on the ears, or in the skin felt by the finger, furnished smears from five places for examination on one slide for study. The number of bacilli found in a few fields allow the cases to be classified in four classes ranging from those with a few bacilli to those with massive numbers, 50 fields being examined when the organisms are very few. From this grading a " bacillary index " is calculated.

The author has combined oral sulphones with intradermal injections of hydnocarpus oil, which were found to speed up the local dimunition of bacilli in patients under treatment with sulphetrone by the mouth. *L. Rogers*

DHARMENDRA & MUKERJEE, N. **Lepromin Test in Cases of Lepromatous Leprosy treated with Sulphones.** *Leprosy in India.* 1950, July, v. 22, No. 3, 128–30.

Reference is first made to earlier tests and to those of SOUZA LIMA and RATH DE SOUZA [this *Bulletin*, 1950, v. 47, 373], with a refined antigen ; there were only 2 of 68 sulphone cases in which a negative result changed to a positive one. The present report is based on lepromin tests in 78 lepromatous patients treated by sulphones for 1 to 4 years, with various degrees of clinical and bacteriological improvement. They all showed either no reaction at all or a slight reaction with an area of erythematous infiltration of about 5 mm. and no, or practically no, induration ; only one showed a reaction which amounted to a weak positive. *L. Rogers*

WATTLEY, G. H. **Duration of Sulphone Treatment of Leprosy.** *Caribbean Med. J.* 1950, v. 12, Nos. 3/4, 89–92.

" An analysis is made of the records of nineteen lepromatous cases who were discharged from a Leprosarium in 1949.

"All cases were M/1 before treatment, and became negative after treatment with one or more of three sulphones, viz., Promin, Diasone, and Sulphetrone.

"The duration of treatment varied from 29 to 53 months, the average duration of treatment being 41 months. The average amount of drugs given in this time was 297 grams of Promin, 263 grams of Diasone and 157 grams of Sulphetrone."

ERICKSON, P. T. **Relapse following Apparent Arrest of Leprosy by Sulfone Therapy.** *Pub. Health Rep.* Wash. 1950, Sept. 8, v. 65, No. 36, 1147–57, 2 figs.

This is a report from the U.S.A. National Leprosarium, which has had the longest experience of the sulphone treatment. Reactivation of the disease of 33 patients followed up, supposedly arrested by the sulphone treatment, included three with clinical and bacteriological relapse and three with only the latter, which are termed sub-clinical relapses. They had been treated with promin, diasone, or both alternately. Details of the cases are recorded. The most important factor appeared to be the discontinuation of treatment after apparent arrest of the disease ; this group included the three patients with clinical relapses, who had received no treatment after they had apparently recovered. This indicates the advisability of continuing the sulphone treatment with smaller doses after apparent recovery. *L. Rogers*

JACONO, G. & COLUCCI, C. F. Prime osservazioni sull'impiego del tiosemicarbazone nella lebbra. [**Thiosemicarbazone in the Treatment of Leprosy.**] *Acta Med. Italica.* 1950, Sept., v. 5, No. 9, 301–4. [24 refs.] English summary (4 lines).

Thiosemicarbazone, or TB 1/698, has been used for the past three or four years for the treatment of tuberculosis. The authors have made trial of it in small doses for leprosy patients. The dose they have started with is 12·5 mgm. Two cases are detailed, one in a patient with mixed leprosy and one with the nodular form. Both had had treatment previously with sulphonamides and PAS. For the former the dose was raised gradually up to 120 mgm. on the 8th day ; for the latter to 50 mgm. on the 6th and 7th days. In neither were the immediate results satisfactory ; there was rise of temperature, lighting up of old lesions and appearance of fresh, with nausea and vomiting, sweating and pain. The treatment was stopped, but after this recrudescence the condition showed a little improvement and bacilli were fewer. [From these two cases the benefit claimed seems to be equivocal, but recently RYRIE has recorded (this *Bulletin*, 1950, v. 47, 1101) better results in 10 patients ; he used larger doses.] *H. Harold Scott*

DINIZ, O. Endemia e profilaxia de lepra em Minas Gerais. [**Leprosy and its Control in Minas Gerais.**] *Folha Med.* 1950, Sept. 5, v. 31, No. 17, 132–4. English summary.

The index of infection of the whole State is said to be 2·09 per mille ; lowest, 1·48, in the north central area, 1·53 in the east, 2·92 in the west and 2·95 in the south. At the end of June, 1950, there were said to be 17,719 known cases, some in leprosaria, some living at home ; but there remained 4,710 needing the attention of the health authorities. Lepromatous cases largely predominated, forming 68·82 per cent. of the whole, tuberculoid 18·1 per cent., and indeterminate the remaining 13·07 per cent.

Control measures suggested are on the usual lines : early diagnosis, isolation of infective patients, systematic periodic examination of contacts of whom there are said to be 50,950 in Minas Gerais, dispensaries and foci for treatment, propaganda, and education of doctors in knowledge of the disease and the laity in its hazards and prevention. *H. Harold Scott*

HELMINTHIASIS

TRAWIŃSKI, A. **Diagnostic Methods in Parasitic Diseases caused by Worms.** *Ann. Univ. Mariae Curie-Skłodowska.* Lublin. Sect. DD. 1950, v. 5, Nos. 7/14, 177–200. [28 refs.]

Trawiński describes techniques for the preparation of antigens for serological diagnosis of infections due to *Cysticercus cellulosae*, *C. pisiformis*, hydatid cyst, *Trichinella spiralis*, *Fasciola hepatica*, *Gastrophilus equi*, *Parascaris equorum*, *Taenia solium*, *T. mediocanellata* (=*saginata*), *T. serrata* (=*pisiformis*), *Moniezia expansa* and *M. benedeni*. The procedures followed and the reactions in both the precipitin and allergic tests are also described in detail. Great importance is attached to the correct preparation of the antigen for successful results. *J. J. C. Buckley*

VASCONCELLOS, D. & LIMA, J. F. Diagnóstico da esquistosomose. [**Diagnosis of Schistosomiasis.**] *Hospital.* Rio de Janeiro. 1950, Sept., v. 38, No. 3, 435–49, 2 figs. English summary. [29 refs.]

The authors give a list of more than 80 localities in Pernambuco where children, both boys and girls, from 7 to 14 years of age were examined for infestation by *S. mansoni*. The numbers examined ranged from less than 100 to nearly 17,000 and it is stated that infestation in Brazil is on the increase. They divide the methods of diagnosis into direct and indirect ; the former comprising discovery of the ova in the excreta, or by duodenal sound, or by biopsy of the liver or rectum ; the latter includes biological reactions such as provoked eosinophilia, the intradermo-reaction, serum precipitin tests and complement deviation.

Each of these is discussed, with references to the literature, and it is concluded that, generally, rectal biopsy is very important but it is not infallible, and that by concentration methods the ova have been seen in the faeces when rectal biopsy has been negative. The provocative eosinophilia [this *Bulletin*, 1947, v. 44, 328] is a useful criterion of severity of infection and for gauging the results of treatment. *H. Harold Scott*

TEN BERG, J. A. G. **Schistosomiasis ; Biopsy of Liver and Rectal Mucosa.** *Documenta Neerlandica et Indonesica de Morbis Tropicis.* Amsterdam. 1950, Sept., v. 2, No. 3, 260–65, 7 figs.

Some 50 sick missionaries from overseas are admitted annually to the St. Franciscus Hospital in Rotterdam. Among these recently were two cases of schistosomiasis.

The first, a man of 42, had been in Uganda for 20 years ; for the preceding 17 years he had suffered from an intermittent bloody diarrhoea which had repeatedly been treated with emetine injections. The liver was enlarged and tender ; repeated microscopical examination of the stools yielded neither protozoan nor helminth parasites. Liver biopsy revealed the presence of ova of

Schistosoma mansoni in characteristic foreign-body tubercles ; a viable *S. mansoni* egg was found in mucus obtained by a digital rectal examination. The patient was given two courses of treatment with Fouadin ; though ova were seen in liver puncture material and in rectal biopsy material after treatment it was considered there was not a persistent active parasitization as these were all dead ova.

The second, a man of 53, had been in China and had worked during internment there in a Yangste river region where *S. japonicum* is endemic. He first had systemic manifestations of schistosomiasis in 1947 and was then treated with fouadin, but in spite of this became gravely ill. He left China in 1949, steadily improved in health, and appeared well on admission to hospital in Rotterdam. There were no gross physical signs, but the stools contained many ova of *S. japonicum*. A liver biopsy in this case revealed foreign-body tubercles around ova of *S. japonicum*. This patient was treated with tartar emetic, but ova were still present in the stools on completion of the course and a biopsy of the rectal mucosa still yielded eggs. He was then treated with Fouadin and, after an interval, with another course of tartar emetic ; after this the eggs vanished from the stools.

Liver puncture and rectal biopsy are valuable in disclosing a chronic schistosomiasis. *A. R. D. Adams*

ARMBRUST, A. DE F. Lesões geniturinárias na equistossomose mansoni. [**Genito-Urinary Lesions in Schistosomiasis mansoni.**] *Hospital.* Rio de Janeiro. 1950, Aug., v. 38, No. 2, 177–210, 9 figs. [61 refs.] English summary.

Two-thirds of this interesting article are devoted to a compilation of records of the literature describing genito-urinary lesions due to *Schistosoma haematobium* as well as *S. mansoni* in spite of the title. After this the author gives details of four cases of much pathological interest. In the first there was found at autopsy schistosomal tubercles, granulomata, scattered in the renal cortex, and in the afferent artery of one glomerulus was an ovum of *S. mansoni* ; others were found in the arteries of the lung and myocardium. The kidney lesions are well shown in photomicrographs. The second patient was a man of 45 years who had had an enlarged scrotum for 20 years, diagnosed as a hydrocele, but the contents were dark in colour and a specimen of biopsy tissue showed many schistosome ova in the tunica albuginea, one in a seminal tubule and another at the lumen of a tubule. These also are well depicted. The third patient was a woman of 27 years with menorrhagia and operated upon for uterine myoma. One Fallopian tube was thickened and ova of *S. mansoni* were found in numbers throughout the walls of the tube. The fourth patient, a man of 42 years, was found at autopsy [the cause of death is not mentioned] to have thickened and fibrous seminal vesicles and an ovum of the schistosome was seen in the muscles of the wall.

In the case of the first patient the ova, to have reached the heart, lungs and kidney, must have passed by way of the circulation ; in the others transference probably took place through communication between the inferior mesenteric veins and the pelvic plexuses. *H. Harold Scott*

SEIFE, M. & LISA, J. R. **Diabetes Mellitus and Pylephlebitic Abscess of the Liver resulting from** *Schistosoma mansoni* **Infestation.** *Amer. J. Trop. Med.* 1950, Sept., v. 30, No. 5, 769–72, 3 figs.

Mansonian schistosomiasis classically causes colitis, portal cirrhosis and splenomegaly. Complications previously reported include glycosuria and

diabetes mellitus, possibly due to the involvement of the pancreas ; this involvement was commonly observed at autopsy [see this *Bulletin*, 1924, v. 21, 938 ; 1934, v. 31, 114 ; 1938, v. 35, 597].

A Porto Rican girl of 17 years had been ill for a month with epigastric pain, vomiting, mild diarrhoea, chills and fever. Ova of *Schistosoma mansoni*, and those of *Trichuris trichiura* and some *Enterobius vermicularis*, were found in the stools. A sugar tolerance test gave a diabetic type of curve ; liver function tests showed some departures from the normal. Treatment was begun with Fouadin, but the patient died suddenly on the ninth day after entering hospital. At autopsy the liver was found to be grossly enlarged (2,980 gm.) and there was a large multiloculated abscess full of green pus in the right lobe ; radicles of the portal vein could be traced through this ; *Bact. coli* and *Bact. aerogenes* were recovered from the pus by culture. Elsewhere in the liver *S. mansoni* eggs were found in association with granulomatous foci, and there was general portal cirrhosis. The pancreas macroscopically was normal, but microscopically *S. mansoni* ova were found in numerous granulomatous foci ; the islets appeared normal. Granulomatous foci were found in large numbers throughout the large intestine, which also macroscopically looked substantially normal.

Diabetes mellitus and an acute pylephlebitic abscess of the liver are rarely recorded complications of a *S. mansoni* infection ; the routine performance of a glucose tolerance test might show the former to be more common than is thought at present. *A. R. D. Adams*

CAIRO : MINISTRY OF PUBLIC HEALTH. MEDICAL AFFAIRS. **6th Annual Report Bilharzia Snail Destruction Section 1947–1948** [ABDEL AZIM, M., Director & BARLOW, C. H., Expert]. 22 pp., 3 folding maps. 1950. Cairo : Govt. Press.

The 6th Annual Report of the Bilharzia Snail Destruction Section, which deals with the period 1947–48, describes the control work in progress in Fayoum and Giza Provinces, in the Oases (Baharia, Kharga and Dakhla), in Qena and Aswan Provinces, in Qalyubiya Province, in Beheira Province, and gives an account of the extension of snail control work to Beni Suef Province in 1947.

Fayoum Province. In spite of difficulties, the relatively low level of infestation attained in previous years, has been maintained.

Giza Province. Satisfactory progress is reported and a survey in 1948 showed that there was a reduction of about 50 per cent. in the numbers of canals infested, in the lengths infested and in the snail population of infested canals.

The Oases. In Baharia no *Bulinus* were found in previously infested wells, in the first survey of 1948. In Kharga, which was hitherto considered to be lightly infested, reports of increasing snail infestation necessitated special attention in this area, which included a new method of sulphation. Good results are reported from the first 1948 survey. In Dakhla treatment by both clearance and sulphation produced a marked reduction in snail population, which had been on the increase in 1947.

Quena and Aswan Provinces. The bi-annual treatment schedule could not be pursued owing to difficulties of treating the perennially irrigated areas in both Provinces. One treatment, however, either of clearance or sulphation was generally possible, and about half of the infested lengths were treated twice, by either method. Comparison of the state of affairs in Spring 1947 and 1948 shows that these limited measures were effective.

Qalyubiya Province. The first year's work presented many difficulties. It was not possible to treat to any extent, but the most heavily infected canals were treated once and a few were treated twice, by clearance or sulphation.

The numbers and lengths infected have been reduced, especially where infestation was by *Planorbis*, which is localized and easier to eliminate. In the Matariva region, where palm leaves are available, these were used to treat drains.

Beheira Province. This is the largest of the Provinces in which the Section operates and the area undertaken covers some 230,000 feddans. From 1947 to 1948 there was a slight reduction in the numbers and lengths of infested canals. In 1947 an additional 180,000 feddans were surveyed for the first time. The survey of this new territory, which lies to the north, revealed that the incidence and distribution of snails was similar to that in South Beheira.

Beni Suef Province. The first survey of this area was begun in December 1947 and finished in summer, 1948. There are 200,000 feddans of cultivated land, mostly on the western bank of the Nile and most of the Province is under perennial irrigation. Irrigation rotations are favourable for the work of the Section, consisting of 3 equal periods of 5 days high water, 5 days optional and 5 days closure. Twenty-three per cent. of some 20,000 canals and drains and 55 per cent. of their total length were found to be infested with snails. There are 77 lakes or ponds in the Province and 38 of them harbour *Bulinus*.

Laboratory work of the Section comprised routine examination of snails, mainly from Giza and also Qalyubiya. In all, 285 samples of *Bulinus* comprising 106,025 snails showed infection rates of 16 per cent. and 0·4 per cent. respectively. Also, 53 samples of *Planorbis* comprising 19,199 snails showed infection rates of 22 per cent. and 0·7 per cent. respectively.

The action of various insecticides and weed killers was tested on snails and Egyptian water weeds. " Benoclor 3C " (chlorinated Benzene and emulsifying agent) at a strength of 30 parts per million killed all snails in 10 hours and in 72 hours in the presence of weeds. "Aquacite", having a similar composition to " Benoclor ", was not so efficient as the latter drug. Various derivatives of dinitro-phenol were also tested and are reported upon unfavourably.

J. J. C. Buckley

WATSON, J. M. **Studies on Bilharziasis in Iraq. Part IV. The National Anti-Bilharzia Campaign.** Reprinted from *J. Roy. Faculty of Med. Iraq.* 1950, v. 14, 25–37, 1 map.

Three preliminary papers of this series have already appeared [this *Bulletin*, 1949, v. 46, 554, 846 ; 1950, v. 47, 1203] ; this, the fourth, gives a general account of the organization and activities of the Bilharzia Section of the Directorate General of Public Health of Iraq. Nation-wide urine examinations are being done to determine the distribution and incidence of urinary schistosomiasis ; the localization and bionomics of the vector (*Bulinus truncatus*) in the endemic areas are being studied ; various methods of treatment and those of snail control are being examined. The incidence of bilharziasis in Iraq in various areas ranges from nil to as much as 80 per cent. ; the marshy districts of the southern provinces along the Tigris and Euphrates rivers are the areas of highest endemicity. Miracil D orally, in doses of 20 mgm. /kgm. daily for 5 days has given good results therapeutically, but its adoption is precluded by its high price ; sodium antimony gluconate is equally effective and less toxic, and it will be cheaper. Mass treatment of a community should only be employed in conjunction with anti-snail measures, and there should be simultaneous instructional propaganda on the prevention of the disease. Means for the eradication of the vector snail are being sought ; in Iraq, in view of the high atmospheric temperature, drying of the smaller canals promises to effect snail destruction ; in large pools and swamps drainage and treatment with copper sulphate or other molluscicides may be effective.

As schistosome dermatitis [due to non-human species of parasites] in some regions seriously interferes with agricultural activities, cercarial repellents and snail destruction are being considered as means of preventing it.

A. R. D. Adams

MAUZÉ, J. & LANGUILLON, J. Essais de destruction de *Planorbis guadelupensis*. [**Trials in the Destruction of** *P. guadeloupensis*.] *Bull. Soc. Path. Exot.* 1950, v. 43, Nos. 7/8, 435–7.

Laboratory tests with *Planorbis guadeloupensis* and different solutions of iron sulphate ($FeSO_4$) gave the following results. After 24 hours in (*a*) a solution of 2 parts per million, 10 out of 20 snails were dead ; (*b*) a solution of 2 parts in 100,000, 20 snails were dead ; (*c*) a solution of 2 parts per million together with tartaric acid of 1 part in 100,000, 20 snails were dead. Comparison of (*a*) and (*c*) shows that the addition of tartaric acid strengthens the action of the $FeSO_4$. The solutions were non-toxic to fish (*Gambusia*). *J. J. C. Buckley*

HAMRICK, L. W., Jr., CLEVE, E. A. & CARSON, R. P. **Chronic Schistosomiasis Japonica : Diagnosis by Rectal Biopsy with Description of Sigmoidoscopic Abnormalities.** *Amer. J. Med. Sci.* 1950, Oct., v. 220, No. 4, 393–9, 2 figs. [26 refs.]

Rectal biopsy has proved the best method for the diagnosis of *Schistosoma mansoni* infection, and is often effective in revealing that due to *S. haematobium*. Though the ova of *S. japonicum* are primarily deposited in the walls of the small intestine, lesions are not uncommonly found in the large bowel ; sigmoidoscopic examination may establish a diagnosis of this infection more commonly than is at present appreciated. It has already been shown in some cases that aspiration of rectal crypts and scrapings or biopsy of rectal and sigmoidal lesions yield *S. japonicum* eggs.

Eighty Filipino soldiers evincing no gross evidence of schistosomiasis, but all from areas where *S. japonicum* is endemic, were submitted to biopsy of the second valve of Houston by means of laryngeal biopsy forceps. The specimens collected measured 4 mm. square and consisted of mucosa and submucosa ; these were firmly compressed, sometimes after wetting, between slides until they were semi-transparent, and were then examined microscopically under a coverslip. By this means *S. japonicum* ova were recovered from 30 of the 80 symptomless patients.

These 30 biopsy-positive and 30 of the biopsy-negative patients were investigated more thoroughly to determine what proportion of the second 30 were infected. Repeated examinations by direct examination, acid-ether concentration, sedimentation and hatching techniques of stools after effective purgation did not yield ova from any of the 30 biopsy-negative group, and did so only in 8 (26·3 per cent.) of the 30 biopsy-positive group. The acid-ether concentration technique proved the most effective method of egg recovery from the stools ; direct film examinations and the hatching technique were markedly inferior.

On sigmoidoscopic examination, 21 of the biopsy-positive patients had visible lesions ; the remaining 9 of this group and all of the 30 biopsy-negative had none. The lesions observed most frequently were submucosal nodules ; these were usually discrete, often multiple in groups of 4 to 10, and commonly best seen on the first and second valves of Houston. Polypoid lesions were seen in 5 patients ; these also were usually in groups of 5 to 10, and were associated with local thickening and pallor of the bowel wall. Occasionally hyperaemic areas, or raised friable granular areas, were seen.

Serial sections of material containing ova showed these chiefly to lie in the submucosa, and suction or scraping would fail to dislodge ova from this site. Two histological types of lesion were observed. The more common was a diffuse fibrous tissue reaction with ova embedded in dense collagen with little cellular infiltration. The less common was the pseudo-tubercle associated with giant cells, eosinophils, lymphocytes, monocytes and proliferating fibroblasts ; the ova [in the latter ?] were frequently distorted, fragmented, hyalinized and sometimes calcified.

Specific antimony treatment did not always cause the disappearance of eggs from the bowel wall ; repeated biopsy [for some years] subsequent to treatment is valuable in determining its effectiveness. *A. R. D. Adams*

PENNER, L. R. *Cercaria littorinalinae* **sp. nov., a Dermatitis-producing Schistosome Larva from the Marine Snail,** *Littorina planaxis* **Philippi.** *J. Parasitology.* 1950, Oct., v. 36, No. 5, 466–72, 1 fig. [10 refs.]

" A dermatitis-producing schistosome cercaria, *Cercaria littorinalinae* n. sp., is described from *Littorina planaxis* Philippi, a marine, operculate gastropod which is common along the rocky shores and islands of the California coast. Experimental production of dermatitis is reported from human and animal volunteers."

KENDALL, S. B. **Snail Hosts of** *Fasciola hepatica* **in Britain.** *J. Helminthology.* 1950, v. 24, Nos. 1 /2, 63–74. [15 refs.]

Although *Limnaea truncatula* is the only important vector of *Fasciola hepatica* in Britain, it was shown experimentally that full development would take place in *L. stagnalis*, *L. palustris* and *L. glabra*, partial development in *L. pereger*, while *L. auricularia* proved resistant to experimental infection. In the susceptible species, other than *L. truncatula*, infection could only be produced in snails a few days old, but these may be regarded as occasional vectors under field conditions. *J. J. C. Buckley*

PICK, F. Le mode de fixation du trématode *Watsonius watsoni* sur la paroi intestinale. [**Mode of Attachment of** *W. watsoni* **to the Intestinal Wall.**] *Bull. Soc. Path. Exot.* 1950, v. 43, Nos. 7 /8, 431–5, 1 fig.

Watsonius watsoni was observed *in vitro* to possess remarkable powers of mobility, such as elongation to nearly three times its normal length, during which the transverse diameter was reduced to less than that of the acetabulum and the anterior end was bent back upon itself. Movements of a distance of 9 cm. in a Petri dish, overnight, were also observed. The function of the oral sucker as an organ of attachment was not discerned, but that of the acetabulum is a complex mechanism in which other parts of the body are also involved.

J. J. C. Buckley

LIE KIAN JOE & BRAS, G. *Plagiorchis javensis* **in Indonesia.** *Documenta Neerlandica et Indonesica de Morbis Tropicis.* Amsterdam. 1950, June, v. 2, No. 2, 182–4, 1 fig.

Two human infections with the trematode *Plagiorchis* are reported, making a total of five recorded from man. A single specimen was recovered from the intestine at autopsy in each instance, from an Indonesian and a Chinese, respectively, who were patients at the Lenteng Agung mental hospital, Java. The worms are described in detail and compared critically with *P. javensis* Sandground, 1940. They are considered to be identical with this species.

J. J. C. Buckley

JOYEUX, C., BAER, J. G. & GAUD, J. Recherches sur des cestodes d'Indochine et sur quelques *Diphyllobothrium* (Bothriocéphales). [**Studies on Cestodes of Indo-China and on certain Species of** *Diphyllobothrium*.] *Bull. Soc. Path. Exot.* 1950, v. 43, Nos. 7/8, 482–9. [13 refs.]

The authors are of the opinion that in Madagascar there seems to be only one species of *Diphyllobothrium*, namely, *D. erinacei-europaei*, a common parasite of carnivores in that country, and that the "*D. latum*" recorded from a dog by Bavay in 1890 was probably in reality *D. erinacei-europaei*. The cestodes of Indo-China referred to are not of medical interest.

J. J. C. Buckley

BRANICKI, J. Rentgenowski obraz Cysticercosis. [**The X-Ray Picture in Case of Cysticercosis.**] *Ann. Univ. Mariae Curie-Sklodowska.* Lublin. Sect. D. 1949, v. 4, No. 3, 497–505, 6 figs. English summary.

An account of four cases seen in Lublin, illustrated by six X-ray photographs.

WOLFF, L. & TEUSCH, W. Über den Befall von Russlandheimkehrern mit *Hymenolepis nana*. [**On the Occurrence of** *Hymenolepis nana* **in German Soldiers returning from Captivity in Russia.**] *Med. Klin.* 1950, Oct. 13, v. 45, No. 41, 1313–16.

The authors found *Hymenolepis nana* in a "large percentage" of German soldiers who returned to Germany from captivity in Russia, but they do not give precise figures. They discuss the morphology, biology and epidemiology of this species and the relationship of its human and murine strains. The information given is taken partly from well-known textbooks or from papers to which no references are given and no new facts of importance are recorded. The somewhat vague symptoms recorded were observed only in patients with heavy infestations and some of them may, the authors suggest, have been the result of imprisonment although they disappeared when the tapeworms were removed.

G. Lapage

CHENEBAULT, J. Note sur la fréquence du kyste hydatique du poumon au Maroc [**A Note on the Incidence of Hydatid Cysts of the Lung in Morocco.**] *Maroc Méd.* 1950, Aug., v. 29, No. 303, 693–6.

The author found, in 41 out of 87,500 persons examined radiologically at Casablanca, pulmonary opacities which he diagnosed as hydatid cysts. The diagnosis of 21 of these was certain ; the other 20 showed a radiogram characteristic of the condition. The Casoni reaction was positive in all 41, but the eosinophilia was very inconstant. Of the persons examined 38,500 were a representative cross-section of the European population of Casablanca, 13,000 were Casablancan Israelis and 36,000 were Mohammedans, most of whom had recently entered Casablanca and left it for variable periods. The examinations were made for pulmonary troubles only and cysts were found in 7 apparently healthy people (3 European and 4 Mohammedan). In children 12 cases were found, an incidence of 34 per cent. The author states that DÉVÉ found cysts in 40 per cent. of children under 15 years. Among the Israelis more women were infected than men, but among the Mohammedans many more men were infected, which is the opposite of the classical view that Mohammedan women are more often infected because of their more frequent contacts with

dogs. One person had 2 cysts on the same side of the body ; 5 had a cyst in both sides. The author's work shows that the infection can be contracted in Casablanca. He compares [without giving references] his own figures with those of earlier workers and concludes that the prevailing view that hydatid cysts are rare in Morocco is wrong, because earlier workers based their statistics on surgical evidence, which missed cysts of the lung and many cysts of the liver. He thinks that the incidence in the agricultural areas of Morocco should be studied by radiological, surgical and other methods. Modern surgery can easily cure the condition, but the necessary preventive measures will be difficult to carry out. At the end of his paper the author summarizes the work of FAURE (1949), which supports his own views. Faure found that the dogs of Morocco are heavily parasitized by the adult tapeworm and that the life of the people favours infection with hydatids, which are not rare ; he suggests a further study of the incidence and the use of skin tests carried out with an antigen made from hydatid sand rather than from hydatid fluid. *G. Lapage*

FAIN, A. *Inermicapsifer cubensis* (Kouri, 1938). Présence du cestode *I. cubensis* synonyme de *Inermicapsifer arvicanthidis* (Kofend, 1917) chez un enfant indigène et chez un rat (*Rattus r. rattus* L.) au Ruanda-Urundi (Congo belge). [*I. cubensis*, **Synonym for** *I. arvicanthidis* **in a Child and a Rat in Ruanda-Urundi, Belgian Congo.**] *Bull. Soc. Path. Exot.* 1950, v. 43, Nos. 7/8, 438–43.

In a collection of cestodes from Ruanda-Urundi, specimens of *Inermicapsifer arvicanthidis* were identified from a rat (*Rattus rattus*) and from an African child aged 6 years, both from the same locality, Astrida. The material is described in detail, and after comparing it with paratypes of *I. cubensis* the author came to the conclusion that the latter species should be regarded as a synonym of *I. arvicanthidis*. [See also BAYLIS, this *Bulletin*, 1949, v. 46, 952.]

J. J. C. Buckley

MUKERJI, A. K. & MATHEN, K. K. **Survey of Hookworm Infection in the Jharia Coalfields Settlement Area.** *Indian J. Med. Res.* 1950, Jan., v. 38, No. 1, 95–118, 1 map.

A hookworm survey was carried out in a large colliery settlement in Bihar which covers an area of 787 square miles, and in which over 100,000 workers are employed in 364 collieries. Samples of 5,291 faeces from different persons was examined by collecting the specimens from the defaecation areas with the aid of a group of trained sweepers. The specimens were put into numbered containers and conveyed to the laboratory the same morning. Into 87 ml. of 1 per cent. salt solution 3 ml. of faeces was placed. After thorough shaking two samples, each of 0·15 ml. of emulsion, were examined. If no ova were found a further sample was treated by Willis's flotation method and the result recorded as "less than 100 eggs per ml." or "nil" as the case might be.

The infection rate was 54·9 per cent. among colliery underground workers, 48·6 per cent. among surface workers, 11·2 per cent. among other workers (mainly clerks) and 28·5 per cent. among non-colliery workers ; the differences are all significant. The infection rate was higher among those living in the colliery quarters ; it was higher among females (46·6 per cent.) and highest in the age group 16 to 20 (47·5 per cent.). It was strikingly low among latrine users, 19 out of 279 or 6·8 per cent., but not so low among users of footwear, 27·3 per cent.

The infection varied inversely with the duration of stay in the mines area, being 67·6 and 64·4 per cent. for the first and second months respectively and 45·3 per cent. for five years or over.

The infection rate varied in individual collieries ; of the fifteen included in the survey, the infection rate varied from 98·1 to 21·3 per cent. among male underground workers, and there was a more or less parallel variation for 87·2 to 12·2 per cent. among surface workers. A similar variation was apparent in the villages, 54·5 to 11·4 per cent. in villages within three miles and 34·3 to 2·5 per cent. in more distant villages.

The degree of infection was recorded for 2,152 of the 2,166 persons found infected ; only two persons (or 0·2 per cent.) had 10,000 or more ova per ml. of faeces : 0·7 per cent. had 5,000 to 9,900 ; 4·8 per cent. from 2,000 to 4,900 ; 12·1 per cent. from 1,000 to 1,900 ; 21·1 per cent. from 500 to 900 ; 45·8 per cent. from 100 to 400 ; and 15·3 per cent. less than 100 ova per ml. In the various groups the degree of infection ran more or less parallel to the incidence of infection.

Other infections found included *Ascaris*—514, *Taenia*—117 and *Hymenolepis nana*—80. *L. E. Napier*

HAHN, P. F. & OFFUTT, E. P. **A Method for the Study of Blood Loss in Hookworm Infestation.** *Science.* 1949, Dec. 30, 711–13.

By the use of radio-active iron, a study was undertaken of the rate of blood loss in dogs infected with hookworm, as a preliminary to similar studies in man. Two dogs were kept at an anaemic level by controlled bleeding ; then 2,000 infective larvae of *Ancylostoma caninum* were applied to the groin and between the toes of each. A heavy infection was demonstrated in five to six weeks. Four weeks after the application of the larvae, each dog received 100 ml. of blood from a dog which, while in an anaemic state, had been given large quantities of radio-active iron in food. Their blood was taken subsequently at intervals, the red cells separated, and the content of radio-active iron estimated.

The radio-active iron that is absorbed by an anaemic dog is nearly all incorporated in the red cells. If there is no blood loss, the level remains nearly constant over many months since the iron from the obsolete cells is re-utilized. When the red cell isotope levels of these two dogs were plotted, they showed a regular drop which appeared to be logarithmic.

The dogs were kept on an adequate diet and it was found that the haematocrit readings soon reached fairly constant levels ; the loss from the activities of the hookworms was being replaced by blood regeneration. It was thus possible from the rate of decline of the red-cell isotope curve to calculate the rate of blood loss, if allowances were made for the blood loss by sampling and the normal decay of the isotope. The formulae for these calculations are given.

In the two dogs used in the experiment it was estimated that the total red cell masses were 250 ml. and 275 ml., respectively, which corresponded to about 1 litre of whole blood, and that it would take 16 to 27 days for the loss of this blood by the activities of the hookworms.

An alternative method would be to give a single dose of radio-active iron directly to the subject infected with worms and to wait about ten days until the isotope had reached a constant value in the peripheral blood.

If after the rate of blood loss had been calculated the subjects were given a vermifuge and all the worms were removed and counted, the amount of blood consumed per worm per day could be estimated. *L. E. Napier*

MATILLA, V., APARICIO GARRIDO, J., DIEZ MELCHOR, F. & PRIETO LORENZO, A. Estudios sobre anquilostomiasis. I. La respuesta inmunitaria frente al parasitismo. Una reacción de fijación del complemento. [**Studies on Ankylostomiasis (I) Immunological Response to Parasitism : A Complement Fixation Reaction.**] *Med. Colonial.* Madrid. 1950, Oct. 1, v. 16, No. 4, 273–80.

The English summary appended to the paper is as follows :—

" The authors performed a reaction of fixation of the complement, with a total antigen of ancylostomes, in 16 cases of ancylostomiasis. Three syphilitic and three normal sera were used as proofs. These six sera responded negatively and of the 16 proceeding from patients attacked by parasites only 5 (31·2%) gave positive reactions. The only datum that agreed in a certain way with these results was the eosinophilia considered in its absolute cypher, wherefore the possible relation between the two aspects of the reactional response with parasitism was pointed out. The authors also indicated a hypothetic relation between the results and the intensity of the symptoms, an inverse relation, since in the most severe cases they failed to discover any immutary [? immunological] signs with the reaction."

WELLS, A. V. **Hookworms in the Throat.** [Correspondence.] *Brit. Med. J.* 1950, Nov. 18, 1173.

The author, in the West Indies, removed " a small red wriggling worm " from the posterior pharyngeal wall of a girl of 21 who had a history of burning pain at one spot in the throat and persistent slight cough of two weeks' duration. The " worm " was removed without difficulty and there was no naked-eye evidence of damage to the mucosa.

Microscopic examination showed the object to be a male and female *Necator americanus* in the act of copulation.

The author notes the unusual site of attachment of the two worms and the duration of their attachment despite regular meals having been taken by the patient. *H. J. O'D. Burke-Gaffney*

TSUCHIYA, H. & AITKEN, L. F. **An Additional Case of** *Trichostrongylus* **Infection with a probable Mode of Transmission.** [Research Notes.] *J. Parasitology.* 1950, Oct., v. 36, No. 5, 502.

SCHMIDT, B. & WIELAND, F. Beitrag zur Frage des Wurmeiergehaltes von Abwässern und Klärschlamm. (Experimentelle Untersuchungen in der Kläranlage der Stadt Stuttgart.) [**The Question of the Content of Worm Eggs in Sewage Effluent and Clarified Sludge. (Experimental Studies in the Sewage Works of the Town of Stuttgart.)**] *Ztschr. f. Hyg. u. Infektionskr.* 1950, Mar. 22, v. 130, No. 6, 603–12, 5 figs.

The authors briefly describe the Stuttgart sewage works which deals with effluents from Stuttgart and Feuerbach. These two effluents are led into 4 settling tanks and the sludge is pumped daily into 3 fermentation tanks, of which two can be heated. In the unheated one the sludge is left 9–10 weeks, in the heated ones, in which it is stirred, 6–7 weeks. The sludge is then dried in two drying beds, from which it is delivered, either as it is or mixed with other materials, as manure. Another part of the mixed effluent is treated in a similar way in 4 other tanks. The fluid from both sets of tanks is further cleansed by distribution by sprinklers over beds of mussel shell and then is discharged into the river Neckar. The sewage works deal with material from about 451,000 people, of whom about 300,000 used water closets.

For study of the eggs the authors used samples taken from the effluents, the settling tanks, the drying beds and the final effluent discharged into the Neckar. These were examined either directly on slides or by a slight modification of Lane's concentration technique. Apart from a few eggs of *Trichuris trichiura*, only the eggs of *Ascaris lumbricoides* were found. A table shows a correspondence between the numbers of eggs found by these two methods.

Tables and graphs show the numbers of *Ascaris* eggs found at intervals during the period (April 1 to Aug. 30, 1948) during which the samples were taken. These show a rise of the number of worm eggs between May and the beginning of August from 24 to 75 eggs per litre of the Stuttgart effluent ; thereafter the number fell to 33 eggs per litre. The numbers found in the Feuerbach effluent also showed a summer increase of the number of eggs found.

Samples taken from the various parts of the sewage water showed that 80 per cent. of the eggs were destroyed in settling tanks and that by the time the final effluent is discharged into the Neckar 97·5 per cent. of them have been destroyed. The authors conclude that transmission of *Ascaris* eggs to man by a modern sewage works is not possible.

In the sludge left for 6–7 weeks in the heated and stirred tanks and for 9–10 weeks in the unheated ones, no eggs were found, so that manure delivered from these tanks cannot transmit *Ascaris* eggs. The mixing of samples taken at intervals of 2-hours between 8 a.m. and 4 p.m. prevented the authors from drawing any conclusions about the mechanical or biological effects of the treatment of the sewage upon the eggs. [See also this *Bulletin*, 1950, v. 47, 866, 867, 868, 1002.] *G. Lapage*

POKORNY, M. & KLAUSOVÁ, Ludmila. Eosinofilní plicní infiltrát. [**Eosinophilic Pulmonary Infiltration.**] *Časopis Lékařů Českých.* Prague. 1950, Nov. 17, v. 89, No. 46, 1297–300.

The English summary appended to the paper is as follows :—

" Eosinophilic pulmonary infiltration is characterized by the x-ray findings of a soft, usually solitary infiltration of the lung, by eosinophilia and the rapid absorption of the infiltration. Owing to the relative absence of symptoms many cases pass unnoticed. In our country the most frequent cause is Ascariasis. Two typical cases are described. In one of them the aetiology was confirmed by the finding of ova in the stools and by a positive cutaneous test ; in the second case no ova were found, but the cutaneous test was strongly positive so that a parasitic origin is most probable. Where the x-ray findings are indefinite this syndrome should be considered. Haematological examination is of assistance in the diagnosis."

HAWKING, F. **Some Recent Work on Filariasis. With Addendum.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1950, Sept., v. 44, No. 2, 153–86, 8 figs. [48 refs.] Discussion 187–92 [GORDON, R. M. ; KERSHAW, W. E. ; MANSON-BAHR, P. ; LOW, C. ; MURGATROYD, F. ; LE ROUX, P. L., HAWKING, F. (in reply).]

Up to 1946 the only compounds known to act on filarial infections were certain antimonial and arsenical compounds, which killed the adult worms, but left the microfilariae unharmed. In 1947 HEWITT and his collaborators [this *Bulletin*, 1948, v. 45, 455] introduced hetrazan, which has a rapid action against the microfilariae of *Litomosoides carinii* in cotton rats and which is effective also against the microfilariae of *Wuchereria bancrofti* in man. The present work of Hawking and his colleagues shows that hetrazan is quickly absorbed from the alimentary canal and penetrates well into the body fluids,

but that in spite of this it does not kill the microfilariae lying in the pleural cavity nor does it destroy the microfilariae which have been added to the serum of animals previously treated with the drug. On the other hand, it acts very rapidly in removing microfilariae from the blood, and when it is injected intravenously, 80 per cent. of the microfilariae of *L. carinii* disappear from the peripheral circulation within one minute. A histological search was made for the microfilariae which had disappeared, and it was found that they were practically all collected in the capillaries of the liver, that within one hour phagocytes collected round the trapped larvae, and that within 18 hours most of them had disappeared. Hawking considers that this destruction of the larvae by the liver is probably a function of the reticulo-endothelial system and suggests that hetrazan sensitizes the microfilariae, so that they are seized and destroyed by the fixed macrophages, the drug acting like an opsonin.

After these laboratory investigations of *L. carinii* infections in cotton rats, field trials of hetrazan were carried out in East Africa on *W. bancrofti* infections in man. In order to investigate whether hetrazan behaves in the same way in man and destroys microfilariae only when they are circulating in the blood a study was made of hydroceles, and it was found that in cases where the larvae were present both in the hydrocele fluid and in the blood, hetrazan only removed the larvae from the blood, the larvae in the hydrocele fluid remaining unaffected. A case of chyluria, with microfilariae in the blood and in the urine, was also studied, and it was found that when the patient was treated with hetrazan the number of microfilariae in the urine was greatly diminished. Owing to the inaccessibility of the adult forms of *W. bancrofti*, the extent of the action of hetrazan on this stage of the parasite is still uncertain. In addition to *W. bancrofti* infections, cases of *Acanthocheilonema perstans* and *Onchocerca volvulus* infections were also treated with hetrazan, and it was observed that although the drug appeared to have little or no effect on the microfilariae of *A. perstans*, it had a marked effect on those of *O. volvulus* ; while the accessibility of the adults of the latter species permitted an estimate to be made of the effects of hetrazan on adult male and female worms situated in the nodules. Twenty-four patients suffering from *O. volvulus* infections were treated with hetrazan in various doses and it was found that the drug was able to remove microfilariae from the skin in most, but not in all, the patients. Its action on larvae in the skin is much slower than its action on those of *W. bancrofti* in the blood, and the results achieved are much less permanent. The matter of permanency, as regards the disappearance of microfilariae, was later explained when the nodules of patients treated with the drug for 13–26 days were subsequently excised and it was found that many of the adult worms were still alive. The authors conclude that hetrazan has little or no action on adult worms of *O. volvulus*.

The toxic effect of hetrazan, when given to uninfected volunteers, was found to be negligible, and a similar absence of toxicity was observed after the treatment of patients suffering from *W. bancrofti* infections. On the other hand, in patients infected with *O. volvulus*, even small doses of hetrazan caused violent allergic reactions ; these subsided within a few days, after which much higher doses of the drug could be tolerated.

Hetrazan does not affect the development of the ingested larvae of *Dirofilaria repens* in the mosquito, nor does it seem to affect the immature forms of *L. carinii* developing in cotton rats. On the other hand, there is some evidence that hetrazan may have a prophylactic action against the development of infective larvae of *L. carinii* after their introduction into the vertebrate host by the vector mite. As regards filarial periodicity it seems reasonable to believe that the microfilariae occurring in the human host are relatively long living and that there remains little evidence to support the view that in *W. bancrofti*

infections a new brood is produced nightly. Where then do the microfilariae go to in the daytime? A study of five monkeys harbouring microfilariae which exhibited nocturnal periodicity, showed that in three of the monkeys the microfilariae content of the lungs was significantly greater in the daytime than in night-time, and Dr. Hawking suggests that a similar diurnal concentration of microfilariae in the lungs may occur in *W. bancrofti* infections.

In the discussion which followed the presentation of the paper, the subsequent speakers paid tribute to the important advances in our knowledge of filariasis which have resulted from the work of Dr. Hawking and his colleagues. Dr. W. E. Kershaw compared the action of hetrazan on the larvae of *L. carinii* as described by Dr. Hawking with the effects of MSb as observed by himself in the same infection. The action of MSb was preponderantly upon the adult worms lying in the pleura, particularly upon the adult females, whereas the microfilariae were apparently unharmed and remained active in the peripheral circulation for four months or even longer. This finding, as Dr. Carmichael Low had pointed out, was of great significance in the interpretation of chemotherapeutic results. The microfilariae occurring in animals treated with MSb could infect the mite vector quite readily and were capable of reaching the infective stage in a similar proportion to those taken up by mites from similarly infected but untreated animals. On the other hand, MSb prevented the development of infective larvae transmitted by the mite to animals previously treated with the drug, a point of some importance when any scheme of mass prophylaxis is being considered.

As regards periodicity, Dr. Kershaw pointed out that in the case of *L. carinii* infections his experiments in Liverpool had suggested the presence of a reservoir in the viscera in which was stored a proportion of the microfilariae from the peripheral circulation, and that at the beginning and end of an untreated infection microfilariae might be found in the pleura although they might not be present in the peripheral circulation.

Sir Philip Manson-Bahr referred to the periodic and non-periodic varieties of *W. bancrofti* which he had recently investigated in Fiji. As a result of his experiments he had shown that the non-periodic form failed to develop in *Culex fatigans*, and he had come to the conclusion that the two varieties of *W. bancrofti* exhibited even more differences than had hitherto been supposed.

Dr. Carmichael Low considered that the use of hetrazan should be limited to those cases of *W. bancrofti* with embryos in the blood; while he thought the suggestion that hetrazan might be used for mass treatment was ruled out on the grounds that in cases of elephantiasis the adult filariae were already dead. As regards periodicity, Dr. Low, while agreeing with Dr. Hawking that the lungs were the probable resting place of the larvae, asked him to explain why the embryos migrated to this region and why they came back again into the peripheral blood.

Dr. F. Murgatroyd asked whether the liver was the place where the embryos were collected and then killed or whether it was the place where they survived the longest after the administration of the drug. He enquired whether the destruction of the microfilariae arose from the action of the drug on the embryos or on the macrophages and whether any *in vitro* experiments had been carried out to elucidate this point. He also wished to know whether embryos had been found concentrated in tissues other than the liver. Finally, he asked Dr. Hawking whether he had observed any clinical evidence of the destruction of embryos in the liver or other organs of treated patients. As regards loaiasis Dr. Murgatroyd was of the opinion that the available evidence suggested that hetrazan was of particular value in the treatment of this form of filariasis, as it caused the rapid disappearance of the embryos from the peripheral circulation, while the disappearance of circulating filarial antibody suggested that the

infection had been eradicated or very markedly reduced. He confirmed Dr. Hawking's finding that hetrazan did not cause the disappearance of the microfilariae of *A. perstans*, and referred to an interesting case of a patient whose blood contained embryos both of *Loa loa* and *A. perstans*, in which treatment with hetrazan had eliminated the former parasite but had had no effect on the latter. Dr. P. L. LEROUX asked whether Dr. Hawking was convinced that the microfilariae occurring in the East African monkeys, used in his experiments, were of a different species from *Dirofilaria repens*.

In reply Dr. Hawking said that in cotton rats treated with hetrazan, practically all the microfilariae which disappeared from the blood could be accounted for by the number appearing in the liver ; the histological appearances showed clearly that the microfilariae were killed there. When normal microfilariae were injected intravenously into a fresh animal over 90 per cent. disappeared from the circulation at once ; this fact made it difficult to investigate whether previous exposure to " hetrazan *in vitro* would accelerate their disappearance. In patients treated with hetrazan there had been no evidence of enlargement of the liver or other signs of inflammatory reaction due to the destruction of microfilariae therein. The microfilaria in East African monkeys was somewhat similar in appearance to that of *D. repens* ; but it must be a different species or genus since its development in the mosquito took place among the muscles of the thorax, while *D. repens* developed in the Malpighian tubes." [Although the opinions expressed at this meeting confirm the claims of previous workers regarding the remarkable effect of hetrazan in causing the disappearance of certain species of microfilariae from the peripheral circulation, nevertheless they suggest that hetrazan, in the dosages so far used, is less effective in destroying the adult worms than was at first expected. A drug active against the microfilariae but inactive against the parent worms would be of value mainly as a means of reducing the infection rate among the arthropod vectors. On the other hand, a drug active against the adult worms, although having little action on the microfilariae, would be of great value in the treatment of filariasis, particularly of infections due to *Onchocerca volvulus*, and the search for a drug of this type should not be abandoned even among those which may have been discarded because of their lack of dramatic effect against the microfilariae.]

R. M. Gordon

CANET, J. & JAHAN, P. Essais de traitement de la filariose canine en Indochine par le l-diéthyl carbamyl 4-méthylpipérazine. [**Therapeutic Trials of Canine Filariasis in Indo-China by l-diethylcarbamyl-4-methylpiperazine (Hetrazan).**] *Bull. Soc. Path. Exot.* 1950, v. 43, Nos. 7/8, 470–82. [31 refs.]

Allusion is made to the author's previous work on the treatment of human filariasis (*W. bancrofti*) in Indo-China with hetrazan [this *Bulletin*, 1950, v. 47, 261]. In patients who received 3 consecutive courses of the drug, the total dose being 3·6 to 5·5 gm., they have observed no return of the microfilariae during more than 8 months' observation. This suggests that the adult worms have been killed. Apparently the microfilariae have returned in some of the patients who received only one or two courses. To prove, however, that all filarial worms are not sensitive to hetrazan in this way, the histories of three dogs are given, in which hetrazan was ineffective.

Dog 1, weighing 35 kgm. was seen in February 1949. Its general state was bad and the blood contained many microfilariae. It was given 1·3 gm. of hetrazan in 6 days, *i.e.* 2 mgm. per kgm. thrice daily. At the end of treatment the general condition had become satisfactory and the blood was free from microfilariae. On the 18th day after treatment, however, pruritus of the skin

reappeared together with reappearance of numerous microfilariae in the blood. A second course was given of 2·1 gm. in 7 days, ending April 4th ; but microfilariae persisted in the blood. The general condition of the dog continued to be good. A third course of 2·68 gm. during 10 days was given ending on May 9th. During this time the microfilariae increased in number. On August 6th the microfilariae were still present in the blood.

Dog 2, weighed 25 kgm. It was very emaciated and dyspnoeic. On April 20th, 1949 the blood at 7 p.m. contained 150 microfilariae per cmm. A course of 0·85 gm. of hetrazan was given during 8 days. The microfilariae were temporarily diminished in number, but 6 days after the end of treatment they were as numerous as ever. A second course of 1 gm. in 6 days was then given. From then on until April 1950 the dog has been re-examined at regular intervals. The microfilariae have persisted for nearly a year, and the clinical condition is unchanged.

Dog 3, weighed 23 kgm. and suffered from various cutaneous lesions. On December 11th, 1949 the blood contained 3 microfilariae per 20 microscope fields. Two courses of hetrazan, each of 1·25 gm. during 8 days were given with an interval of one month. After the first course there was a temporary diminution of the number of microfilariae but they soon returned and in April 1950 they were as numerous as ever. After the first course, the clinical condition greatly improved.

The microfilariae were non-periodic and possessed no sheath. They measured 160–240 μ long by 5–6 μ wide. The tail was attenuated posteriorly and there was a clear portion about 20 μ long beyond the last nucleus. The microfilariae resembled those of *Dirofilaria immitis*, or possibly those of *Acanthocheilonema dracunculoides* but accurate identification is not possible. During the treatment of these dogs, no allergic reactions occurred, which is further evidence for the absence of any significant microfilaricidal effect.

F. Hawking

HUGHES, T. E. **Some Stages of** *Litomosoides carinii* **in** *Liponyssus bacoti*. *Ann. Trop. Med. & Parasit.* 1950, Oct., v. 44, No. 3, 285–90, 8 figs.

" 1. Some microfilariae of *Litomosoides carinii* were found to migrate from the gut of the mite *Liponyssus bacoti* into the surrounding tissues within 24 hours of ingestion.

" 2. There are present in the lumen of the gut of the mite large cells capable of phagocytic ingestion of the microfilariae in the gut.

" 3. The subsequent development of the microfilariae into infective larvae takes place in the parenchyma of the mite, in which the viscera are embedded.

" 4. The phagocytic cells are probably normally occupied with the formation of the ball-like clumps of non-crystalline black spherules which are later excreted per anum."

VAN SOMEREN, V. D. & MCMAHON, J. **Phoretic Association between** *Afronurus* **and** *Simulium* **Species, and the Discovery of the Early Stages of** *Simulium neavei* **on Freshwater Crabs.** [Correspondence.] *Nature.* 1950, Aug. 26, 350–51, 1 fig.

Simulium larvae and pupae have been found attached to nymphs of the ephemeropteran *Afronurus peringueyi* in several rivers in Kenya. The *Simulium* adults which were bred out were remarkably like *S. neavei*.

This discovery led to a search being made in February 1950 for the larvae of *Simulium neavei* in rivers near Kericho, an area where onchocerciasis and *S. neavei* adults occur.

Evidence was soon obtained that there is a definite association between fresh water crabs (*Potamonautes* (*Potamon*) sp.) and the larvae of a *Simulium* species resembling *S. neavei* ; the larvae were found on the crabs.

The association between crabs and this *Simulium* coincides with the distribution of *S. neavei* adults, whereas the *Afronurus* and *Simulium* species seem to occur at a higher altitude well outside the *S. neavei* belts.

The *Simulium* forms will be described in detail later.

It is mentioned that similar *Simulium-Afronurus* associations have been recently found in the Belgian Congo by Dr. G. Marlier. *H. S. Leeson*

NETTEL F., R. Exploración de los focos de oncocercosis de Chiapas. [**Investigation of Foci of Onchocerciasis in Chiapas.**] *Medicina.* Mexico. 1950, Oct. 10, v. 30, No. 613, 405–31, 1 fig. & 1 map.

The English summary appended to the paper is as follows :—

" In the south and north of the State of Chiapas, México, where Onchocerciasis prevails, 25,209 simuliids were collected in 402 localities. The captures were made only on humans, an hour in the morning. In places where Onchocerciasis is more prevalent, *S. ochraceum*, *S. metallicum* and *S. callidum* was found in greatest proportion ; and in the localities where Onchocerciasis is less, *S. haematopotum* was found greatest. *S. pulverulentum*, *S. samboni* and *S. veracruzanum* was found a little. We captured eight species of simuliids, because we use by attractive of the insects only three peasants."

PUYUELO, R. Le traitement de l'onchocercose en Haute-Volta. Premiers essais chimiothérapiques par la 1-diéthyl-carbamyl 4-méthylpipérazine. [**The Treatment of Onchocerciasis in Upper Volta. Preliminary Chemotherapeutic Trials of 1-diethyl-carbamyl 4-methylpiperazine (Hetrazan).**] *Bull. Soc. Path. Exot.* 1950, v. 43, Nos. 7/8, 462–70.

The author has treated 70 patients suffering from onchocerciasis with hetrazan since June 1949 ; 67 of these suffered from ocular onchocerciasis. The dose was 6 mgm. per kgm. daily, *i.e.* up to 0·4 gm. daily for an adult for 10 days. [It is not clear, whether this was base, or the citrate salt which contains only 50 per cent. of base.] On the first three days the doses were increased progressively, *viz.*, 0·1 gm. on the first day plus 2–4 tablets of an antihistamine compound such as Phenergan or Neo-Antergan ; on the 2nd day, 0·2 gm. hetrazan plus 2–4 tablets antihistamine ; on the 3rd day 0·3 gm. hetrazan plus 2–4 tablets antihistamine, etc. A second course was given after 15 days and two other courses after intervals of 20 days. In practically every case allergic reactions appeared in a few hours and lasted 4–6 days. They included general phenomena, *e.g.*, fever 38–39°C., asthenia, arthralgia, myalgia, anginal precardial pain, tachycardia and sometimes intense headache with nausea and giddiness. There was also pruritus, adenopathy, erythrodermia, exfoliative dermatitis, localized oedema, painful enlargement of the cysts (in 95 per cent. cases), photophobia, blepharospasm, etc. Some patients had diarrhoea and expelled intestinal worms. There was a leucocytosis of 8,000–9,000 per cmm. [*sic*] and an eosinophilia of 30–50 per cent. These symptoms subsided by the 4th–6th day and the microfilariae in the skin were greatly diminished in number. The production of these allergic reactions can be used as a diagnostic test for onchocerciasis. When patients are given a second course the reactions are much less severe.

To obtain the maximum possible sterilization, four courses should be given in one year, and two more courses spread out during the second year.

The microfilariae of the skin disappear quickly by the 4th–6th day, rarely by the 10th day. Those in the nodules disappear more slowly, but 50 per cent. of cases are free from them by the 45th day. The effect on the adult worms is less active and less rapid, but apparently biopsies have not yet been made to investigate this. Many of the patients passed *Ascaris* or hook-worms during treatment.

The clinical state of the patient after treatment showed general amelioration —increase of weight, diminution of anaemia, increase of appetite, etc. The cutaneous lesions rapidly improved but pruritus tended to persist a long time. In patients with ocular onchocerciasis, phenergan alone was given for two days before hetrazan was administered, and the dose was raised to 3–6 tablets per day to diminish the intensity of the allergic reaction. Photophobia disappeared by the 3rd–6th day, as did the conjunctival pain. Watering of the eyes rapidly ceased. In many cases there was greater or less improvement of visual acuity, and the patient could usually return to work, which was formerly impossible.

F. Hawking

McQuown, A. L. *Capillaria hepatica* : **Report of Genuine and Spurious Cases.** *Amer. J. Trop. Med.* 1950, Sept., v. 30, No. 5, 761–7, 4 figs. [10 refs.]

The first authentic case of human infection with *Capillaria hepatica* was recorded by MacArthur [this *Bulletin*, 1924, v. 21, 963] in a British soldier who died in India. The second is recorded here, and is concerned with a female negro child, aged 17 months, of Louisiana, who died after admission to hospital.

The course of the illness, necropsy findings and other relevant information are described in detail. Sections of the lungs revealed marked pulmonary oedema, numerous macrophages and interstitial inflammation, but no parasites. In the liver there were numerous granulomas filled with *C. hepatica* eggs, situated in the periportal spaces, and areas of degeneration and necrosis were present. No adult parasites could be demonstrated. The final pathological diagnosis was : *Capillaria hepatica* infection of the liver, pulmonary oedema, interstitial pneumonitis, acute cardiac dilatation with congestive failure, malnutrition, dehydration and ascariasis.

A spurious case of *C. hepatica* infection is also recorded, also from Louisiana, in an adult female who was passing *C. hepatica* eggs for two days after a slight illness.

Comment is made upon the resemblance between the eggs of *C. hepatica* and *Trichuris trichiura* and the importance of being able to differentiate them, in view of the possible misdiagnosis of other cases of *C. hepatica* infection. Four illustrative photomicrographs are given.

J. J. C. Buckley

Schmidt, J. & Mendheim, H. Epidemiologisch-statistische Untersuchung über die Verbreitung der Oxyuriasis. [**An Epidemiological and Statistical Study of the Distribution of Enterobiasis.**] *Ztschr. f. Hyg. u. Infektionskr.* 1950, May 25, v. 131, No. 1, 65–8.

Mendheim and Scheid (*Med. Monatschr.*, 1947, v. 1, 355, *ibid.*, v. 2, 147 and this *Bulletin*, 1950, v. 47, 68) found *Enterobius* in 71·4 per cent. of a group of children examined once and in 81·8 per cent. of another group of children examined twice. The results here described were obtained from examination by the "Cellophane" swab of 85 children and 3 adults in an orphanage; they were examined four times during periods of three weeks. The authors also examined the stools of the same people by zinc chloride flotation and again found that stool examinations are useless for the detection of *Enterobius*. There were 82 children aged 6–16 years, one aged 3 years and 3 adults. Among

these 88 persons there were 48 males and 40 females and *Enterobius* was found in 76 (86·4 per cent.) of them. Stool examinations showed *Ascaris* in 5 children (5·7 per cent.) and *Trichuris* in one (1·1 per cent.). *Enterobius* was much more common in the boys than in the girls, a fact which the authors ascribe to the greater cleanliness of the girls.

Vaginal samples taken from the girls with "Cellophane" showed that 3·5 per cent. of the girls thus examined had eggs of *Enterobius* in the vagina (*cf.* 10 per cent. found by the authors in their earlier work).

The highest incidence of *Enterobius* was found in the children aged 6–10 years (males 96·1 per cent., females 85 per cent.) and the authors ascribe this to the beginning of compulsory school attendance. In the dust of the schoolrooms HANNAK, MENDHEIM and SCHMIDT (in the Press) found numerous *Enterobius* eggs and the children showed the periods of freedom from symptoms and periods of increased symptoms associated with the exit of the gravid female worms through the anus. The female worms lay eggs in the folds of the buttocks, where they may not always be found if the infections are light. Repeated examinations are therefore necessary and the tables given show the increase of the numbers of infected persons detected when one to four swabs are taken. Four anal swabs detected all the infected persons except that a fifth was needed to detect the infection of one of the adult females. Because the female subjects were more lightly infected they needed more examinations than did the more heavily infected males. *G. Lapage*

JEFFERY, G. M. **Incidence of** *Enterobius vermicularis* **in Puerto Rican Children, with a comparison of Two Diagnostic Methods.** *J. Parasitology.* 1950, Oct., v. 36, No. 5, 485–8.

"A total of 84 children, 2 to 14 years of age, was examined for *Enterobius* infection in the outpatient clinics of the University Hospital in San Juan, Puerto Rico. Each child was subjected to two diagnostic methods : the NIH cellophane swab, followed by the Graham cellulose tape method. An incidence of 3.6 per cent was detected with the NIH swab, while 11.9 per cent was positive when the cellulose tape was used. The average number of eggs per positive NIH swab was 2.7 as contrasted to an average of about 116 eggs per positive cellulose tape. These results again demonstrate the reported superiority of the cellulose tape method of diagnosis, and provided some additional support to the contention that tropical conditions do not favour transmission of *Enterobius*.

"Eggs of *Trichuris* and *Ascaris* also were detected in the samples. An average of 7 *Trichuris* eggs was found in 6 per cent of the NIH swabs, while an average of 22 was detected in 16.7 per cent of the cellulose tape samples. A single *Ascaris* egg was detected in one of the NIH swabs (1.2 per cent) while an average of 19 appeared in 9.5 per cent of the cellulose tape preparations."

ROCKENSCHAUB, A. Zur Frage der Oxyuren in operativ entfernten Appendices. [**The Question of Oxyurids in Appendices removed Surgically.**] *Wien. klin. Woch.* 1950, Feb. 24, v. 62, No. 8, 140–41.

The author cut open appendices that had been removed surgically, washed out their contents into water in a Petri dish and examined them against a dark background. He prefers this method to the usual one of histological examination, saying that by it the worms are easily seen and that single ones can be readily found.

The method, used over a considerable period, gave the author the impression that *Enterobius* was commoner in the appendices of children than in those of adults, but a statistical study of the results showed that this impression was

wrong. The appendices examined were divided into those of children under 14 and those of adults over 14. A table shows the percentages which (*a*) contained *Enterobius* ; these showed no histological evidence of inflammation : (*b*) showed acute or subacute appendicitis ; (*c*) had been removed in the " cold stage " without inflammation ; (*d*) showed other pathological conditions.

There was no significant difference between the incidence of *Enterobius* in the uninflamed appendices of adults (23 per cent. of the 117 appendices examined) and those of children (24 per cent. of the 83 appendices examined) ; but the incidence of appendicitis itself showed marked differences. Among the children only 12 per cent. of the 83 appendices were in the " cold stage ", while 42 per cent. of the adult appendices were in this condition. On the other hand, acute appendicitis was present in 58 per cent. of the children's appendices and in only 29 per cent. of those of the adults. Agreeing that oxyurids in the appendix may cause boring pains and that even the most marked inflammation of the appendix may cause only slight clinical symptoms, the author says that one may therefore feel obliged to remove an appendix when *Enterobius* is found in the stool and he quotes a record of the disappearance of boring pains caused by *Enterobius* after appendicectomy. *G. Lapage*

SÁNCHEZ CASTELLANOS, M. Apendicitis parasitarias. [**Parasitic Appendicitis.**] *Rev. Kuba Med. Trop. y Parasit.* 1950, May–June, v. 6, Nos. 5/6, 82–4.

Intestinal parasitism seems to be rife in Cuba. Records from various provinces are given ; for example, at Alacranes, Matanza province, of 200 faecal samples examined, 150 proved positive, 15 with protozoa only, 105 with helminths and 30 with both. Again, cases of appendicitis are many in Cuba and a small proportion is associated with helminthic infection. Thus, of 375 appendices examined at the Havana Municipal Hospital, 20 contained worms : 15 *Enterobius vermicularis*, 5 *Trichuris trichiura*, one both of these, and one *Ascaris lumbricoides* [these total 22, unless two were multiple infections].

The author has studied 80 appendicectomy cases in many of which faecal examinations had been made prior to operation. In 36 the faeces had been positive and worms were found also in the excised viscus ; in 11 the faeces were positive but the appendix negative ; in 12 faeces and appendix were both negative. In 18 cases the condition was too urgent to permit delay for examination of the faeces, but in these the appendix was parasitized. The commonest infection of the appendix was *Trichuris trichiura*, present in 49 of the 80 cases. *H. Harold Scott*

ERNST, W. Ein Beitrag zur Wirksamkeit des Phenothiazins in der Diagnose und Behandlung der Oxyuriasis. [**The Efficacy of Phenothiazine in the Diagnosis and Treatment of Enterobiasis.**] *Med. Klin.* 1950, July 14, v. 45, No. 28, 863–6. [10 refs.]

Encouraged by the work of HÄNEL and WEISS [this *Bulletin*, 1949, v. 46, 961], the author tested Contraverm, tablets of which contain 0·2 gm. phenothiazine. Discussing some of the literature on the toxicity of phenothiazine to man, he notes that MILLER (1942) and BERCOVITZ, PAGE and DE BEER (1943) [no reference is given to these two papers] observed no ill-effects with the purified phenothiazine they used and that Hänel and Weiss reported that great purity of the phenothiazine is needed to avoid the effects on the blood and the red coloration of the urine. HÄNEL (*Pharmazie*, 1950, v. 5, 18) confirmed the relative non-toxicity of phenothiazine and EUCKER [this *Bulletin*, 1950, v. 47, 557] gave the optimal dose for children of 9 years, on a basis of a body weight of 28 kgm., as 1·7 gm. phenothiazine, given over a period of 2 days.

The present author treated inmates of the Bruchsal penitentiary. The treatment revealed infection with *Enterobius* in 180 men (39·13 per cent.), a figure which agrees with the incidence reported by other workers cited. Each patient was given 4·2 gm. phenothiazine+0·168 gm. phenolphthalein during 2 days. He observed no side effects except occasional slight flatulence and dark coloration of the urine. The doses were 4 tablets of Contraverm 3 times on the first day and 3 tablets 3 times on the second day. Each tablet contained 0·2 g. phenothiazine and 0·008 gm. phenolphthalein (to prevent hardening of the stool). One mental patient took the whole 21 tablets on one day without ill-effect beyond very slight subjective complaints.

The haemoglobin of all patients was observed by the Sahli method before treatment and 4 days after it, and the results, given in a table, show no significant reduction of haemoglobin. No worms were expelled during the treatment. They were seen on the first day after the treatment in 168 patients and on the second day in 12. Living worms were seen only on the first day after the treatment, not singly but in swarms. By the fourth day after treatment only isolated worms were expelled. Three patients passed *Ascaris* (in one of these 7 days after treatment) and 1 passed *Trichuris*.

Discussing Schüffner's views on relapses the author notes that the makers of Contraverm (Ludwig Heumann & Co., Nuremberg) recommend a repetition of the treatment on the twentieth day after the previous last dose (not before 2 weeks and not after 3 weeks). The author gave 155 of the 180 infected patients a second treatment on either the eighteenth, nineteenth or twentieth day after the first one. After this second treatment *Enterobius* was found in only 8 of these 155 (5·16 per cent.) and there were no ill-effects. After 20 days these 8 were given a third treatment, after which 6 were negative and remained so 2 months later ; 2 were positive and the persistence of the infection in these is ascribed to abnormal intestinal conditions.

The author claims that Contraverm fulfils as nearly as possible Schüffner's requirements that an ideal anthelmintic should be cheap, non-toxic, easy to take (Contraverm tablets are odourless and tasteless), that it should be necessary to give it on one day only and that it should kill young as well as older worms.

G. Lapage

ZIMA, O., v. WERDER, F., VAN SCHOOR, A., HOFFMANN, A. & HEPDING, L. Die Entwicklung des Egressin, eines Oxyurenmittels. [**The Development of Egressin, a Remedy for** *Enterobius*.] *Schweiz. med. Woch.* 1950, July 15, v. 80, No. 28, 734–5.

The authors outline the chemical work done in the laboratories of Messrs. Merck, Darmstadt, which led to the discovery of Egressin [see also this *Bulletin*, 1950, v. 47, 1025]. They searched among derivatives of carbaminic acid for an anthelmintic. Their earlier work had shown that derivatives of carbaminoylcholin damage intestinal worms. Probably they, and other anthelmintics, act on the nervous systems of the helminths of whose metabolism little is known. Known anthelmintics belong to various groups of substances and there is no clear relationship between their constitution and mode of action. They enquired how far the molecule of a carbaminoylcholin with substitution of its nitrogen must be changed to give a substance which does not lose its stimulant action on the muscle of the helminth and yet causes the least possible disturbance of the host. The normal high toxicity of carbaminoylcholin is related to its rapid absorption and this also hinders the establishment of the high concentration in the gut required to affect the worms.

About 200 substances of the urethane type were tested and a relationship between their constitution and mode of action was found, which is briefly

indicated. A list of some of these is given. None of these substances was effective against *Ascaris*, but Egressin (N-isoamylcarbaminic acid- 3-methyl-6-isopropylphenyl ester) was found to be close to the ideal remedy for human enterobiasis. It is a colourless, crystalline substance with its own characteristic odour and also a faint smell of thymol. It is readily soluble in organic media, but hardly at all in water (less than 1 : 50,000) and has a melting point of 57°C.

All the substances were tested : (1) On earthworms placed in a diluted solution of the substance. Substances inactive against earthworms were found by the authors to be also inactive against intestinal worms. The authors found, however, that urethane derivatives which had a strong action on the earthworm had none on *Ascaris*, but that some of them had a slight action on *Enterobius*. Thus the tests done on earthworms had only a negative significance. (2) On isolated muscle-preparations made from earthworms, leeches and tapeworms. (3) On *Ascaris* from the pig and *Passalurus* from the rabbit [see also EICHHOLTZ and HOTOVY, below]. Substances giving positive results by these methods were tested on animals naturally or experimentally infected and those which passed these tests were then tried on human volunteers from the population widely infected with *Ascaris*. These human tests still further reduced the number of substances likely to be of value, but the authors were not satisfied with their animals tests.

[No mention is made of the work of BALDWIN and MOYLE, noted in this *Bulletin*, 1949, v. 46, 854, who proved the unsuitability of annelids for testing substances required for treatment of nematode infections, or of the work of TRIM, and ROGERS summarized by LAPAGE, *Research*, 1948, v. 1, 310.]

G. Lapage

EICHHOLTZ, F. & HOTOVY, R. Ueber die Pharmakologie und Toxikologie des Egressin. [**The Pharmacology and Toxicology of Egressin.**] *Schweiz. med. Woch.* 1950, July 15, v. 80, No. 28, 736–7.

The authors found that mice, rats and guineapigs given the highest possible doses of Egressin suspended in gum arabic or in rapeseed oil suffered no ill-effects. Cats given 20 gm. /kgm. by the mouth, which completely filled the stomach, showed only slight sleepiness. Dogs became sleepy after doses of 1 gm. /kgm. These extremely high doses were excreted in the faeces as white crystalline masses.

When Egressin dissolved in paraffin oil was given in doses of 2 gm. /kgm. to cats or dogs by the mouth the tolerance of it was the same, but in rape-seed oil or alcohol it was not quite so well tolerated. A dose of 2 gm. of Egressin in 3 cc. of alcohol given to a cat caused a longer sleep than did alcohol alone. A dose of 2 gm. /kgm. in rape-seed oil caused sleepiness and ataxic gait in a cat. Dogs did not tolerate well a 40 per cent. solution of Egressin in rape-seed oil and doses of 0·5 gm. /kgm. caused vomiting, dizziness and cramps. Human volunteers tolerated doses up to 6 gm. well. Treatment of 300 patients confirmed this and showed that repeated doses were not toxic, but a third of the adults treated developed diarrhoea, which is not undesirable from the point of view of treatment. In people with slight gastritis and in some taking Egressin in the morning on an empty stomach, 2 gm. may cause slight gastric troubles or nausea. Some children may show slight loss of appetite on the day of the dose, but children erroneously given 4 gm. in a single dose showed no toxic effects. In 3 adults who were heavy cigarette smokers, Egressin caused dizziness and nausea and these symptoms may occur when much alcohol or fat is taken because of the solubility of Egressin in these media.

The insolubility of Egressin in water made pharmacological studies difficult, but its action on the isolated frog's heart and on the small intestine of the rat and its *in vitro* action on the earthworm, *Ascaris* and oxyurids are briefly indicated. For *in vivo* tests the oxyurid *Passalurus ambiguus* in the rabbit was used. [A note is interpolated on the action on this species of Doryl [carbaminic and cholinester] and of DDT, both of which are partially effective, while gamma-benzene-hexachloride is not]. A single dose of 0·1 gm. /kgm. of Egressin usually caused the expulsion of practically all the *Passalurus* present either dead or alive, without toxic effects on the rabbit. A dose of 0·4 gm. /kgm. was needed to expel single specimens of *Toxocara cati* of the cat and higher doses were required to expel *Ancylostoma caninum* of the dog and tapeworms (*Dipylidium caninum* of the dog and *Taenia taeniaeformis* of the cat). In these high doses Egressin is useful against oxyurids, tapeworms, hookworms and ascarids (of the cat).

When Egressin was tested on infections of mice with the oxyurids *Syphacia obvelata* and *Aspicularis tetraptera*, autopsy showed that no effect on these species was obtained by two doses of 1 gm. /kgm. of the preparation given during two days.

Experiments on the absorption of Egressin showed that it was not absorbed from the intestine of the dog. In the urine neither Egressin nor its derivatives (thymol) were found. Human urine was free from phenol products after doses amounting to 12 gm. Three doses of Egressin given to the frog had no action on the ciliate *Opalina ranarum* in the frog's rectum. *G. Lapage*

SAUER, A. & WEISSFLUG, I. Klinische Prüfung des Egressin. [**Clinical Tests of Egressin.**] *Schweiz. med. Woch.* 1950, July 15, v. 80, No. 28, 737–8.

This paper records the clinical tests of Egressin done in the Orthopaedic Clinic of the University of Heidelberg. EICHHOLTZ *et al.* [this *Bulletin*, 1950, v. 47, 1025] suggested a dose of 1 gm. Egressin for children of 2–12 years and 2 gm. for older children ; after further work they suggested that children 2–12 years old should have 3 separate doses of 1 gm. in 2 days and patients over 12 three separate doses of 2 gm. in 2 days with evacuants, but not castor oil, on the third day.

The anal swabs of the orthopaedic patients treated by the authors could be taken weekly or daily over long periods. Some suffering from chronic enterobiasis were ambulant. In one series of cases anal swabs were taken twice a week and in another daily, Hall's technique being used for both series.

In the first series (treated by Sauer) 24 patients were treated with the doses mentioned above. To children Egressin was given as a powder mixed with *cold* pudding, or similar food. Adults took it in cold water or cold coffee. Later the tablets now available were given broken up in a spoonful of cold water together with cold coffee, ice, etc. Anal swabs of the 24 patients (13 children, 11 adults) showed that 95 per cent. passed no eggs for 3–8 weeks. The itching at the anus, vulva and in the vagina disappeared after 3 single doses. On the second day after treatment and after a purge a large number of oxyurids were expelled, most of which were dead. The blood picture examined twice a week showed no changes, apart from the effect on the eosinophilia, which usually disappeared. [No figures are given.] Of the 24 patients, 40 per cent. remained negative during the 3 months during which they were observed and in 5 per cent. of the cases the treatment failed even when it was repeated.

In the second series, conducted by Weissflug, 35 patients with chronic enterobiasis were given the treatment outlined above. From them the daily anal swabs recommended by Schüffner were taken by the Hall technique and the numbers of eggs on the " Cellophane " area were counted. The eggs were classified as those with a granular plasma, those with larvae in them and empty

ones. From the empty ones perhaps a certain number of larvae had wandered back into the rectum. The disturbance of sleep, itching at the anus and vulva and in the vagina disappeared in all the patients. The anal swabs were negative in 90 per cent. of the patients for 3–6 weeks. In 34 per cent. eggs were found again 4–6 weeks after the treatment, but 57 per cent. remained negative for an observation period of 4 months. In 10 per cent. the treatment failed even when it was repeated. In 4 out of 5 patients with *Ascaris*, a single *Ascaris* was expelled during the treatment. The toleration of Egressin was confirmed, but in some adults it caused diarrhoea.

Similar good results were obtained with 200 other cases of chronic enterobiasis treated in private practice. Of 5 cases of bed-wetting 3 were cured by the removal of the enterobiasis which caused it. In severe cases a repetition of the treatment is recommended. *G. Lapage*

DEFICIENCY DISEASES

DAVER, M. B. **Biometric Studies of School Children of Hyderabad State.** *Indian Med. Gaz.* 1950, Sept., v. 85, No. 9, 412–15.

Heights and weights, averaged by assessed age, of 18,000 children from 5–15 years in Hyderabad are recorded.

KLENERMAN, Pauline. **Nutritional Oedema. A Survey of Cases at the King Edward Hospital, Durban.** *South African Med. J.* 1950, Oct. 21, v. 24, No. 42, 891–4.

The cases described appear to have conformed to the fully-developed "Kwashiorkor" pattern. The children, whose ages ranged from a few months to 4 years, had oedema, anaemia, hypoproteinaemia, pellagroid skin rashes, pigmentary changes in skin and hair, glossitis, cheilosis, and enlarged livers. Between June, 1948, and December, 1949, 727 such children were admitted to the King Edward Hospital, Durban, of whom 358 died. Oral casein hydrolysate, Ventriculin and lactic acid milk are stated to have been effective in treatment, but no comparative data are given. [Indeed it is a great pity that the author has not recorded many more details of the observations made. This series of cases of florid kwashiorkor is probably the largest ever collected and the present cursory account does it less than justice and contributes nothing to our still imperfect knowledge of the condition.] *Dean A. Smith*

COUTO, C. Estudo clínico da pelagra. [**Clinical Study of Pellagra.**] *Hospital.* Rio de Janeiro. 1950, July, v. 38, No. 1, 1–52, 10 figs. [51 refs.]

A good general account of pellagra from the clinical aspect illustrated by details of 15 patients. In each case information is given of the personal and family histories, the clinical condition, the state of the alimentary, circulatory, respiratory and nervous systems and the results of examination of the blood. Several of these are further illustrated by photographs showing the cutaneous lesions. *H. Harold Scott*

HAEMATOLOGY

RAMALINGASWAMI, V. & VENKATACHALAM, P. S. **Haematological Studies on Healthy Adult Men in Coonoor and Ootacamund (Altitude 6,000 to 7,500 Feet above Mean Sea-Level).** *Indian J. Med. Res.* 1950, Jan., v. 38, No. 1, 17–28. [40 refs.]

Blood counts were made in 100 normal Indians living at altitude of 6,000 to 7,500 feet in Southern India. Standard techniques were employed: the haemoglobin was estimated by Wong's method with a photo-electric colorimeter standardized by the iron-content method.

The mean counts were: erythrocytes, 5·36 million per cmm., haemoglobin, 15·82 gm. per ml., packed cells, 49·27 per cent., mean corpuscular volume (M.C.V.), 92·27 cu. μ, mean corpuscular haemoglobin (M.C.H.), 29·69 $\gamma\gamma$, mean corpuscular haemoglobin concentration (M.C.H.C.), 32·25 per cent., and leucocytes, 7,288 per cmm. The mean differential count showed neutrophils, 46·2 per cent., lymphocytes, 45·5 per cent., monocytes, 3·1 per cent., and eosinophils, 4·4 per cent.

The authors noted an inverse ratio between the red cell count and both the M.C.V. and the M.C.H. [They appear to see a physiological significance in this, whereas it probably indicates nothing more than the variability of the notoriously inaccurate red cell count.]

Much of the paper is devoted to references to other workers' findings on which the authors rely, as much as on their own, to arrive at their conclusions which are that "the haematological adjustment to a chronic anoxic stimulus does not involve primarily an increase in the circulating red blood cells and haemoglobin, but that an increase in the corpuscular surface area and a close correlation between cell volume, cell number and cell haemoglobin are of greater significance". [The authors' findings were different from those of many other Indian workers and it is a pity that they were not able to include some haematological studies at sea level by the same technique.] *L. E. Napier*

KAPLAN, E. & ZUELZER, W. W., with the technical assistance of Linda HOOGANA. **Erythrocyte Survival Studies in Childhood. I. Methods and General Observations.** *J. Lab. & Clin. Med.* 1950, Oct., v. 36, No. 4, 511–16, 4 figs. [11 refs.]

KAPLAN, E. & ZUELZER, W. W., with the technical assistance of Linda HOOGANA. **Erythrocyte Survival Studies in Childhood. II. Studies in Mediterranean Anemia.** *J. Lab. & Clin. Med.* 1950, Oct., v. 36, No. 4, 517–23.

"The erythrocytes from patients with Mediterranean anemia transfused into normal recipients have an abnormal survival, which is characterized by the accelerated elimination of 25 to 50 per cent. of the cells and normal survival of the remainder. The erythrocytes from individuals with the carrier state of Mediterranean anemia, and from one child with severe hypoferric anemia of iron deficiency, had normal survival when transfused into normal recipients. Normal erythrocytes have normal survival when transfused into patients with Mediterranean anemia.

"The existence of a hemolytic component in Mediterranean anemia has been confirmed by the study of erythrocyte survival. This hemolysis results from an intracorpuscular erythrocyte abnormality which is not apparent in the carrier state of the disease and is not related simply to a quantitative deficit in erythrocyte hemoglobin.

"The hypothesis is offered that in Mediterranean anemia those erythrocytes in which the basic defect in ultrastructure or composition is associated with marked deformities of shape are destroyed rapidly while the remainder have a normal survival time."

KAPLAN, E. & ZUELZER, W. W., with the technical assistance of Linda HOOGANA. **Erythrocyte Survival Studies in Childhood. III. Unusual Familial Hemolytic Anemias associated with Intrinsic Erythrocyte Abnormality.** *J. Lab. & Clin. Med.* 1950, Oct., v. 36, No. 4, 524–30, 3 figs.

"By means of the study of the survival of transfused erythrocytes an intrinsic erythrocyte abnormality was demonstrated in members of two families with atypical chronic familial hemolytic anemia.

"The pattern of elimination of the patients' erythrocytes transfused into normal recipients was similar to that in sickle cell anemia and congenital hemolytic icterus.

"Normal erythrocytes transfused into these patients had normal survival except following a fulminating crisis in one child when the survival method enabled us to demonstrate a superimposed acquired extracorpuscular hemolytic disturbance."

ELSDON-DEW, R. **Ethnology of Sicklaemia in Uganda.** [Correspondence.] *Nature.* 1950, May 13, 763–4, 3 figs.

The author refers to the observations of LEHMANN and RAPER on the distribution of the sickle-cell trait in the Africans of Uganda [this *Bulletin*, 1950, v. 47, 267.]

He suggests that, in studying the relationship between various tribes, it is better to use gene frequencies rather than frequencies of the sickle-cell trait and that a quantitative measure of assumed racial mixing can be calculated in these terms. He shows that the distributions do not correspond to those of the ABO blood group. It is pointed out that care is needed if the record contains several members of the same families. *J. A. Fraser Roberts*

PERUTZ, M. F. & MITCHISON, J. M. **State of Haemoglobin in Sickle-Cell Anaemia.** *Nature.* 1950, Oct. 21, 677–9, 3 figs. [15 refs.]

HARRIS, J. W., with the technical assistance of Stephanie J. BUNTING. **Studies on the Destruction of Red Blood Cells. VIII. Molecular Orientation in Sickle Cell Hemoglobin Solutions.** *Proc. Soc. Exper. Biol. & Med.* 1950, Oct., v. 75, No. 1, 197–201, 2 figs. [16 refs.]

"1. In the oxygen unsaturated state the abnormal sickle cell hemoglobin molecules undergo orderly orientation, forming—by specific linkage of the individual molecules—long chains of hemoglobin elements. Subsequent parallel alignment of these elements results in birefringent tactoids.

"2. The birefringent sickled erythrocyte is in all probability a membrane-covered hemoglobin tactoid.

"3. The clinical and pathologic manifestations of sickle cell disease apparently follow as a consequence of the effects of the abnormal hemoglobin molecules upon the physical behavior of the eyrthrocytes."

SCHNEIDER, Rose G. & LEVIN, W. C. **Production of Specific Antisera against Sickle Cell Anemia Erythrocytes ; Antibody in Sicklemia Sera.** *Proc. Soc. Exper. Biol. & Med.* 1950, Oct., v. 75, No. 1, 110–14.

" 1. Erythrocytes from 2 individuals with sickle cell anemia, when injected into rabbits, produced antisera which agglutinated erythrocytes of 19 individuals with sickle cell anemia, but not those of 21 individuals with sickle cell trait nor those of 124 normal individuals.

" 2. Such sera may be useful in the differential diagnosis between sickle cell anemia and sickle cell trait.

" 3. The presence of agglutinin antibody has been demonstrated in the sera of all of 13 patients with sickle cell anemia. This finding may explain the hemolysis which is characteristic of this disease.

" 4. Of 11 patients with sickle cell trait, definite agglutinin antibody was demonstrated in the sera of 4, and doubtful agglutinin antibody in 2."

NEEB, H. Een geval van erythroblastische anaemie van Cooley. [**A Case of Cooley's Anaemia.**] *Nederl. Tijdschr. v. Geneesk.* 1950, Nov. 11, v. 94 (iv), No. 45, 3219–26, 5 figs. on pl. [Refs. in footnotes.]

The English summary appended to the paper is as follows :—

" Description of a case of Cooley's erythroblastic anaemia (thalassemia) in an Indo-European young man of 24 years.

" The uncommon facts are : 1. The discovery of this anomaly in an Indo-European young man ; 2. The patient has no ties with any of the Mediterranean populations, and 3. has reached the age of 24 years.

" This is the first case discovered in Indonesia and probably the first publication in the Dutch medical literature."

RAMALINGASWAMI, V. & MENON, P. S. **Folic Acid in Nutritional Macrocytic Anaemia.** *Indian J. Med. Res.* 1949, Oct., v. 37, No. 4, 471–81, 6 figs. on pl. [40 refs.]

Out of 45 patients attending the nutrition clinic of the Nutrition Research Laboratories at Coonoor, 7 with uncomplicated nutritional macrocytic anaemia (NMA) and one with sprue were selected for special investigation. One patient with NMA was given crude liver extract in doses of 6 ml. on alternate days for 44 days. The other 6 patients were treated with folic acid (Folvite) orally in daily doses of 20 mgm. for 2 to 3 weeks followed by 10 mgm. for the rest of the period of observation, 30 to 70 days. The patients with NMA were plantation labourers on a poor diet known to be deficient in B vitamins and animal protein ; 3 were women [only 2 are so designated in the table]. No parasitic infections were demonstrated, free hydrochloric acid was present in each case and no signs of spinal-cord involvement were seen. Their complaints were lack of appetite, fatigue and diarrhoea ; pitting oedema was found in six cases ; and mild peripheral neuritis was present in three, oro-lingual signs of riboflavin deficiency in two, and Bitot's spots in one case.

All responded well to treatment. In the 6 cases of NMA treated by folic acid the red cell count rose from 1·50, 2·06, 1·19, 1·46, 1·83 and 1·98 millions per cmm. to maxima of 4·86, 4·39, 3·55, 4·36, 3·89, 3·84 in the period of observation ; the last 3 cases were followed up for only 30 days. Reticulocyte peaks of 9 to 18 per cent. were observed between the sixth and eleventh days. The patient with NMA on crude liver extract improved from 0·96 to 3·97 million red cells per cmm. in 44 days with a reticulocyte crisis of 12·4 per cent. on the sixth day, whereas the patient with sprue improved from 2·77 to 3·68

millions per cmm. in 35 days on folic acid treatment. There was, however, in the latter case, no improvement in the haemoglobin level and thus lack of response persisted after another month of treatment with proteolysed liver.

There was in each case an immediate clinical improvement within the first few days ; however, other signs of avitaminosis persisted.

Discussing the marrow pictures in NMA, the authors state that the " megaloblasts were in various stages of cytoplasmic ripening with a concomitant lag in nuclear maturation resulting in characteristic transparent lacy chromatin patterns. In three other NMA cases, although megaloblasts were present, they were, however, extremely scarce, and instead, the bone-marrow was crowded with erythroblasts ranging from 14 μ to 20 μ in diameter, with deep blue cytoplasm and a dense nucleus showing condensation of chromatin and obliteration of nucleoli. The majority of these cells appeared to be similar to early normoblasts and some of them with more primitive nuclei could be classified as pro-erythroblasts. Cells intermediate between the two also occurred. There was no tendency for these cells to acquire haemoglobin; haemoglobinization if it occurred was associated with advanced nuclear degeneration as in the later stages of normoblasts. In fact the ' asynchronism ' between the nucleus and cytoplasm so characteristic of pernicious anaemia (MELLARME, 1948) was strikingly absent and the arrest of maturation seemed to be along the line of normoblastic erythropoiesis and at the level of the early normoblast." The bone marrow changes are illustrated by 6 photomicrographs.

L. E. Napier

VENOMS AND ANTIVENENES

MENDES, E. Alergia ao veneno botrópico e crotálico. [**Snake Venom Allergy** (*Bothrops* **and** *Crotalus*).] *Hospital.* Rio de Janeiro. 1950, Sept., v. 38, No. 3, 459–61.

The English summary appended to the paper is as follows :—

" The author reports a case of a 29-years old woman who presented asthma, conjunctivitis and allergic rhinitis caused by exposure and inhalation of snake venom.

" The patient worked during 9 years in a laboratory for manufacture of blood clotting factors derived from snake venom powder. The allergic symptoms started after two years of exposure to the venoms. Cutaneous tests gave strongly positive reactions to Bothrops and Crotalus venoms. P.K. [Prausnitz-Küstner] local passive transfer test gave positive results with both venoms. All allergic manifestations faded out when the patient left her job."

LEESON, F. **Identification of Snakes of the Gold Coast.** pp. x+142, 65 figs. & 33 pls. 1950. London : Crown Agents for the Colonies, 4 Millbank, S.W.1. [18*s*.]

MELFI, J. La picadura de hormiga. [**Ant-Stings.**] *Prensa Méd. Argentina.* 1950, July 21, v. 37, No. 29, 1659–64, 3 figs.

In Argentina stinging by ants is common and is usually disregarded, but in some cases it would seem that an allergy is established and stings by a common red ant, *Pheidole obtusopilosa*, are followed by quite serious symptoms of an anaphylactic character. Brief details of four such cases are given and the symptoms produced were : a painful and burning sensation at the site, followed very soon by intense pruritus and a feeling of heat extending from the feet

all over the body accompanied by a flushing of the skin, blurring of vision, ocular and palpebral conjunctivitis, lachrymation, oedema of lips and buccal mucous membrane, swelling of tongue, difficulty in speaking and swallowing, with salivation. Adrenaline soon gives relief. The venom is a mixture of formic acid and a toxalbumin. *H. Harold Scott*

DERMATOLOGY AND FUNGUS DISEASES

CHIRIBOGA, J. Incidencia y caracteres del mal del pinto en los Andes orientales del Peru. [**Incidence and Characters of Pinta in the Eastern Andes.**] *Rev. Argentina Dermatosifilologia.* 1950, June, v. 34, No. 2, 116–30, 3 graphs & 2 figs. [27 refs.] English summary.

These investigations have been made at different times during the years 1944 to 1947, sixteen months altogether, in localities of the eastern Andes, in the town and hospital of Quillabamba, and various settlements and estates, urban and rural. Diagnosis was made on the grounds of clinical condition, search for treponemata, serological tests and biopsy examinations. The numbers found in the different localities varied greatly, but in many of the places the totals examined were quite small ; except for the town of Quillabamba, in three only of the localities was the number over 100. Generally speaking, it may be seen that the proportion increased as the levels were descended to the tropical conditions at the base of the hills.

Of 1,769 examined (969 males, 800 females) 413 were found infected (23·3 per cent.) and the sexes almost equally, 223 (23·0 males) and 190 (23·7 per cent.) females. The increase rose almost steadily with age up to 16 years, the percentage figures being 7·2, 16·7, 16·4, 23·4, 29·7, 25·0, 32·9 and 36·1 for each two years. As regards race incidence, this was higher among the indigenes with their low level of sanitation, less among the whites and coloured who lived in better surroundings. The influence of altitude is well shown by the returns : of 299 examined at 700–1,000 metres 124 cases were found (41·4 per cent.) ; between 1,000 and 1,400 metres, of 376 examined 85 (22·6) were found ; at 1,200 to 1,700 metres, 35 were affected among 283 examined (12·3 per cent.) ; moreover the proportion increased when those from relatively free heights descended to the lower levels. At higher levels cases appear to be more sporadic and to have less relation to age.

Clinically, certain forms are more common than others ; those most often seen are the trichophytoid or psoriasiform, often with considerable pruritus, and there seems to be a tendency for the initial circumscribed lesion to remain so for a long time before generalization occurs. Others start with an erythemato-squamous lesion with subsequent pigmentation, more marked in the more chronic cases. The colours seen are very varied—black, blue, brown, violet, rose-coloured. In valleys where there are patients with hypothyroidism there is a peculiar dermatitis with atrophy, changes of pigment, oedema of the skin, or dry and desquamating. *H. Harold Scott*

WATSON, J. H. L., ANGULO, J. J. & OLARTE, J. **Electron Microscopic Observations of Stromatolysis in Human Erythrocytes.** *Proc. Soc. Exper. Biol. & Med.* 1950, Oct., v. 75, No. 1, 134–9, 22 figs. [13 refs.]

" Widely different degrees of stromatolysis were observed electron microscopically in erythrocytes which occurred in preparations of *Treponema carateum* taken from tissue fluid of skin lesions. A comparison of electron

images with light microscopic images of cells under controlled conditions of stromatolysis showed striking similarities. Isolated appearances in the electron micrographs similar to all the stages of disintegration of hemolyzed erythrocytes reported by Furchgott from light microscopy are represented and observed."

MACKINNON, J. E. & GURRI, J. Morfología y mecanismo de multiplicación de *Paracoccidioides brasiliensis* en su forma parasitaria, estudiada por el método del carbonato de plata. [**Morphology and Mechanism of Multiplication of *P. brasiliensis* in its Parasitic Form, studied by the Silver Carbonate Method.**] *An. Facul. de Med. Montevideo.* 1950, July, v. 35, No. 7, 1033–8, 8 figs. [13 refs.] English summary.

The cytology and mode of reproduction of *Paracoccidioides brasiliensis* in parasitic and in saprophytic life has been the subject of earlier publications by Mackinnon and his associates [see this *Bulletin*, 1950, v. 47, 84, 1125].

The morphology of *P. brasiliensis* in parasitic life was studied in frozen sections of infected tissue stained by the silver carbonate method of Rio-Hortega (*Arch. de Histología normal y patológica,* 1942–3, v. 1, 329). For this work, guineapigs were inoculated intratesticularly with a culture of the fungus and killed 8 days later. The findings in the earlier reports on the study of the parasite stained by haematoxylin and Best's carmine were confirmed in the present work, especially the impression of thinness of the cell membrane ; it was shown that the multiple buds on the yeast-form, which characterize the species, are, in fact, true buds and not spores formed within the parent cell and extruded through pre-existing pores in the cell wall. The layer of cell membrane carried on the buds is even thinner than on the parent cell and it forms a slender, almost invisible, pedicle connecting the bud with the parent cell. After the liberation of the bud as a free vegetating cell, the remains of the pedicle may persist as a more or less patent tube or as a slit or opening in the wall of the exhausted or dead parent cell. *J. T. Duncan*

TROPICAL OPHTHALMOLOGY

GUERRA, P. Congiuntivite acuta epidemica stagionale nell'East Africa. [**Acute Seasonal Epidemic Conjunctivitis in East Africa.**] *Boll. Soc. Ital. di Med. e Igiene Trop.* (Sez. Eritrea.) 1949, v. 9, No. 6, 393–413. [40 refs.]

The condition described by the author he found to be endemic in Eritrea and Ethiopia for 7–8 months of the year, and to become more severe and widespread in April and May at the time of the "small rains", and very severe and epidemic in October–December, the season of the "big rains". At the latter season some 65 per cent. of children up to 12 years of age and 10 per cent. of adults are attacked out of a population of about 200,000.

The onset of symptoms is acute. At first there is a sensation of a foreign body in one eye and after 2–3 hours a diffuse hyperaemia of the conjunctiva, especially at the tarsus and fornix areas, with secretion at first mucoid but soon becoming muco-purulent. Palpebral oedema with chemosis rapidly supervene and children are unable to open the lids. Ocular pain and headache vary and may be intense, with rise of temperature of 1–1·5 degrees. Within 24 hours, as a rule, the other eye is involved and usually more severely than the first ; after 34–36 hours the pain begins to subside and the local condition reaches its acme about the third day. Perforation may occur, but generally the lesions begin to recede at the end of a week and the less serious cases clear up in 3 weeks or so.

Certain atypical forms are noted : abortive, mild, which begin to regress about the 4th day and clear up in a fortnight ; those with symptoms of punctate keratitis ; the pseudo-membranous form and those associated with trachoma. The cause appears to be the combined action of the Koch-Weeks organism and *Neisseria catarrhalis*. The most satisfactory treatment is in the author's experience, sulphapyridine, 5–6 cgm. per kilo intramuscularly each day ; local application of the powder proved less satisfactory, the results being inconstant. *H. Harold Scott*

HEAT STROKE AND ALLIED CONDITIONS

ROBINSON, S., KINCAID, R. K. & RHAMY, R. K. **Effect of Salt Deficiency on the Salt Concentration in Sweat.** *J. Applied Physiol.* 1950, Aug., v. 3, No. 2, 55–62, 4 figs. [18 refs.]

It is well-established that there may be a reduction of the salt concentration in the sweat of men during several days of acclimatization to heat, but some workers have found no significant change during repeated daily exposures. Skin temperature has a direct effect on the salt concentration in sweat, and there is a relationship between the rate of sweat secretion and the salt concentration in the sweat. There is also evidence that the reduction in concentration observed during acclimatization to heat is related to the development of a salt deficit. The experiments here described were intended to ascertain whether or not a salt deficit is a necessary condition in bringing about a reduction of chloride in the sweat during acclimatization.

The data obtained supported the conclusion that this reduction depends on the development of chloride deficiency due to excessive loss of salt in the sweat. The response occurred when large volumes of sweat (4 to 7 kgm.) were secreted daily by unacclimatized men consuming up to 203 milli-equivalent of chloride per day. In these instances the chloride output in the first two or three days exceeded the intake, a deficit developed, and the reduction in concentration in the sweat occurred even at elevated body temperatures. With a consumption of 200 mEq. of chloride per day and exposure to the same heat stress for shorter periods, so that the total chloride output was much less than the intake, the reduction did not occur. When the chloride intake was raised to exceed the output, men who in daily exposures to heat had previously reduced the chloride concentration in their sweat to low levels reversed the response—the sweat chloride began to rise on the third day after the intake was increased, and this reversal occurred despite better temperature regulation and lower body temperature. Salt deficits previously produced in unacclimatized men during cool weather, without activity of the sweat glands, resulted in the secretion of sweat with reduced chloride concentration even on the first day of work in the heat. *Thomas Bedford*

MISCELLANEOUS DISEASES

RAPER, A. B. & LADKIN, R. G. **Endemic Dwarfism in Uganda.** *East African Med. J.* 1950, Sept., v. 27, No. 9, 339–59, 11 pls. & 2 figs. [18 refs.]

A study of the " pigmy " dwellers of the Mabira forest near the source of the Nile in Uganda shows that this so-called Banakalanga tribe is actually composed of pathological dwarfs incapable of procreation. These " pigmies "

are suffering from a type of cachectic infantilism which occurs on the fringes of a fertile well-watered young forest area traversed by running streams (unusual in Uganda) where Simuliids breed in large numbers. The disease occurs among any of the tribes living in the area regardless of sex, social class, or position in the family, always provided that there has been a sufficient length of residence in the forest area.

The children, of healthy mothers by uneventful pregnancies, show retardation, usually about the time of weaning, becoming thin, weak, and listless. Maximal severity is in the 8–15 age period, the child being extremely listless and apathetic, small and wasted with slender limbs and a small head which, however, appears disproportionately large. Movements are few and effort minimal, there is severe wasting of the glutei, pectorals and masticatory muscles associated with gross lack of tone. The children may be unable to stand or lift their heads, and their movements resemble those of a child with muscular dystrophy. The cranium is normal in shape but the wasting of the masticatory muscles narrows the lower parts of the face, the mandible is small, short and sharply pointed, and the normal-sized teeth project forward, the lower incisors pointing directly forward when the mouth is opened. Puberty is delayed and the secondary sex characteristics are diminished in appearance. Appetite is poor, probably owing to a lack of interest in eating. They crave sugar, not because of hypoglycaemia, but once it is obtained they only eat it very slowly. There is much day-to-day variation in well-being. Specific signs of malnutritional defect are few and inconstant, the local and family nutrition is reasonable and good feeding in hospital for a period of 50 days produced no significant change.

Radiologically the bones are slender, having a narrow cortex and a lack of medullary structure ; epiphyseal ossification is delayed and irregular. The cranium and the pituitary fossa show no bony lesions. All showed infestation with *Onchocerca volvulus* by skin snip and all had nodules and were both earlier and more heavily parasitized than their non-affected neighbours. Other parasitism is neither marked nor constant. There is an apparent reduction in urinary 17-ketosteroid output. [The tables summarize a variety of clinical and pathological investigations.] There is some mental retardation but no evidence of any organic nervous disease. No post-mortem studies were obtained.

The authors consider that this form of cachectic infantilism is a manifestation of anterior pituitary dysfunction, and there may also be a failure of adrenal cortical function. The examinations made sufficed to exclude all the known types of cachectic infantilism. In considering the possible aetiological factors, attention is drawn to the reports of DE BRUN (*Rev. de Méd.*, 1910, v. 30, 802) and HEWER [this *Bulletin*, 1933, v. 30, 44] who both reported basically similar conditions. In Uganda, malaria, ankylostomiasis, chronic liver and pancreatic fibrosis and malignant malnutrition can be excluded as main causative factors and no evidence can be offered either way as regards the possibility of a mineral deficiency or excess, save that the local soil, flora and fauna exhibit no suggestive peculiarities. The local inhabitants, who have long recognized the disease, have abandoned mystical explanations and incriminate the bites of the Simuliids. The authors consider the rôle of onchocerciasis in this disease, drawing attention to the possibility of it occurring in other onchocercal areas in western Uganda, an association not recorded elsewhere and very difficult to explain if established.

In using, for the present, the non-committal term " nakalanga disease ", the authors point out that infantilism in tropical countries is uncommon and tends to occur in small foci, whereas the usually invoked causative factors are widespread. Therefore they " favour the view that the nakalanga disease forms part of a wider problem, one to which the true line of approach has not yet been discovered ".

[Those interested in nutrition will wish to consult the original article which will doubtless be followed by further studies on the lines indicated. Elsewhere it remains to determine if this disease is associated with onchocerciasis, and also if it is, as the authors suggest, a general problem, or a local one in this and possibly in other forest areas. No matter what the aetiological factors may be, the disease poses fascinating problems in the elucidation of its pathogenesis.] *J. N. P. Davies*

FERRO-LUZZI, G. Segnalazione di un caso di Onyalai in Eritrea. [**A Case of Onyalai in Eritrea.**] *Boll. Soc. Ital. di Med. e Igiene Trop.* (Sez. Eritrea.) 1950, v. 10, Nos. 1 /2, 19–25. English summary (3 lines).

This record is of interest for two reasons ; one, that it is the first case of onyalai to be recorded from Eritrea ; two, that it occurred in a European, both the man's parents being Italians who had lived in Eritrea for about 40 years. The patient was a man of 24 years who, on and off, for 3 years had complained of abdominal pain. In May, 1950, he had a more severe attack and though faecal examination revealed nothing abnormal, he was given rectal injections of Yatren. The pain became worse, so, after five injections, the Yatren was stopped. Shortly before the injections had been started the patient had observed small aphthae on the buccal mucosa. Then, on 20th June, he felt generally ill, with headache and catarrh, but no fever ; two days later he had a shivering attack, followed by vomiting and violent headache, with a burning sensation in the mouth and a temperature of 40°C. Next day the temperature was down to 38° and thereafter was irregularly remittent. At the end of the second day of illness he noticed petechiae on the backs of his hands and a vesicle containing blood in the mouth ; he felt very prostrated and was in an anxious state. The same evening he had an urgent call to micturate and passed urine intensely haemorrhagic and he came for treatment. There were then petechiae on the backs of the hands, the right arm and the thorax. On the buccal mucosa and on the tongue were haemorrhagic bullae in size from a lentil to a chickpea.

Epitomizing the signs and symptoms : Subjectively, there were profound asthenia, headache, pain in the mouth and abdomen and muscles, fever irregularly remittent about 38°C., frequent micturition with dark red bloody urine for about 72 hours, then rapidly diminishing in blood content, melaena disappearing as the pain in the abdomen ameliorated, petechiae in skin and haemorrhagic vesicles in the mouth. Improvement began in 5 days and convalescence was well on the way by the 11th day. Blood examination showed platelets on the 4th day 20,000 ; on the 6th day 42,500 ; on the 10th day 400,000, on the 12th day 700,000 ; and on the 14th day 350,000 ; red corpuscles 3,000,000 per cmm. during the first 6 days of disease, and haemoglobin 70 per cent., becoming normal in convalescence (20th day). After the second day of disease the patient was given daily penicillin, vitamins C and K [doses not stated] and 100 cc. of whole blood intravenously. *H. Harold Scott*

RUDRA, M. N. & KANT, L. **A Field Investigation into Lathyrism.** *Indian Med. Gaz.* 1950, Sept., v. 85, No. 9, 415–18, 1 fig. [25 refs.]

" Lathyrism ", say the authors, " is one of the major health problems of Bihar " and is endemic in the northern parts. The authors examined 138 persons in some of the villages and found 133 of them affected—Hindus and Mohammedans, male and female, young and old. Twenty-five of them were in the 5–10-year age-group, 24 in the 25–30-year group. Of the 133 only 18

were females and 12 of these were between 5 and 15 years of age. All those attacked had been living on *khesari* for some time and it is to be noted that this is resorted to only when there are no other grains left. As regards the fundamental cause, the authors believe it is due to lack of methionine. The fact of a child of two years, almost entirely breast-fed, being attacked opens up the question of maternal transmission ; this is not necessarily due to a toxin in the mother's milk, but if the mother's diet has a low methionine content, her milk may be similarly deficient. Prostigmin has been recommended in the treatment of lathyrism, but it did not prove very satisfactory in the authors' cases.

H. Harold Scott

KHLENTZOS, C. T. **Seventeen Cases of Poisoning due to Ingestion of an Eel, *Gymnothorax flavimarginatus*.** *Amer. J. Trop. Med.* 1950, Sept., v. 30, No. 5, 785–93.

A most interesting account treating in detail of 17 Filipino patients brought to hospital out of 57 who showed symptoms of poisoning after partaking of a meal of the cooked flesh of an eel, *Gymnothorax flavimarginatus*. This is a large eel, some 6 ft. long and 1 ft. thick, found in tropical seas, as Saipan, the Marshalls and eastern Caroline Islands, especially in coral reef areas and known to be poisonous when eaten ; there is no evidence that its bite is toxic. The symptoms were very definite : early tingling and numbness of lips and tongue and inability to talk, followed by shouting and later vomiting. Thereafter the symptoms were almost entirely neural. In severe cases there was dulling to loss of consciousness and actual coma, with perhaps Cheyne-Stokes rhythm and respiration purely abdominal. Some showed conjunctivitis and sluggish or abolished pupil reflexes. As consciousness returned many became at first restless, then were seized with tonic and clonic convulsions with profuse sweating. Two died and *post mortem* there was seen to be widespread bronchopneumonia. One of these had been ill for 20 days and had never regained consciousness ; the other became conscious on the 12th day and died two days later. [In another part of the paper, these are reversed and one is said to have died " without regaining consciousness after fourteen days, and one after 20 days, being conscious about two days ".] A few developed sequelae—muscular weakness, ulnar paralysis and interosseus atrophy—which, however, improved later. Treatment is symptomatic. The actual poison has not been isolated, though Japanese workers have carried out investigations. The effects are those of muscarine and nicotine and it may be a quaternary ammonium compound. The feeding habits of the eel are varied but no connexion could be traced between its food and the toxicity of its flesh.

H. Harold Scott

FISCHER, W. O. **Primary Carcinoma of the Liver in East African Natives. Is it caused by an Infective Agent ?** *South African Med. J.* 1950, Oct. 14, v. 24, No. 41, 869–71, 1 fig.

In smears made from the pituitaries of seventeen African mine workers who had died of primary cancer of the liver, intracellular rickettsia-like bodies were seen. No such basophilic inclusion bodies were found in the pituitaries of Africans who had died of other diseases. By inoculating guineapigs and rabbits with emulsions of the affected human pituitaries the condition could be transmitted, and bodies varying from 1·5 to 3·2 μ in diameter appeared in the cytoplasm and nuclei of several organs in the body. Extracellular forms were also present. After inoculation the animals became indisposed, with few symptoms beyond a general loss of condition, and death occurred after periods varying from two days to a year.

[The wide prevalence of hepatic cancer in the Bantu races of Africa is well known and has been ascribed to the high incidence among these people of hepatic degeneration caused by an inadequate diet. Dr. Fischer's observations are of peculiar interest in this connexion.] *Harold Burrows*

PROTOZOOLOGY : GENERAL

WESTPHAL, A. & FINKE, L. Der Hund als epidemiologischer Faktor der Toxoplasmose des Menschen. [**The Dog as an Epidemiological Factor in Human Toxoplasmosis.**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1950, Sept., v. 2, No. 2, 236–9.

It has been noted previously that in dogs infection with toxoplasms runs a mild course with parasites in the blood and sometimes in the urine. The present authors have found that virulent strains of *Toxoplasma* when inoculated into dogs produce a latent infection which could only be detected serologically by the Sabin-Feldman dye test. These observations led them to suspect the dog as a possible reservoir host of human toxoplasmosis. In this paper are reported a number of instances in which cases of human disease occurred in households where infected dogs were kept.

In one case, an animal breeder who kept a dog suffering from toxoplasmosis was also found to have a latent infection, the dye test reacting to a titre of 1 : 400. In another case, abortion of a dead infant with hydrocephalus was induced in a woman in whom the dye test later showed a positive reaction at 1 : 100. Further investigations revealed toxoplasmosis in a dog kept in the household as well as in the woman's husband. In the third case, a woman who already had two healthy young children, gave birth to an infant with hydrocephalus. Microscopic examination of the sediment of the cerebrospinal fluid of the infant revealed toxoplasms, which were successfully transmitted to laboratory animals. Both in the child and in the mother the dye test was positive. During the 5th and 6th months of the mother's pregnancy, three dogs living in the same house became ill, one succumbing to the disease. The dogs were thought to be suffering from toxoplasmosis, but their owners refused to submit them to serological tests.

In the fourth case the circumstances were somewhat similar : a hydrocephalic infant was born from a latently infected mother, and there was a sick dog in the house. In the fifth case a woman, whose dog died six months previously of "distemper", herself suffered from convulsions, the toxoplasmic nature of which was determined by a positive dye test (1 : 200). In the sixth case, a dog which had recovered from symptoms of nervous distemper was found to be suffering from toxoplasmosis. The whole family to which it belonged, including three children, also proved to have latent infections, their sera reacting positively to the dye test at titres from 1 : 25 to 1 : 100. A number of the foregoing cases were successfully treated with aureomycin.

In view of the proven association of infected dogs with cases of human toxoplasmosis, it is concluded that dogs probably play an important epidemiological rôle in this disease. Although treatment of visceral toxoplasmosis with aureomycin, introduced by Westphal, not only lowers the titre in Sabin and Feldman's test but also eliminates the parasites, the danger of neglecting the epidemiological factors should not be underestimated. *C. A. Hoare*

LAVEN, H. & WESTPHAL, A. Die Übertragung von *Toxoplasma gondii* unter besonderer Berücksichtigung des Blutes als Infektionsquelle. [**Transmission of *T. gondii* with special reference to Blood as a Source of Infection.**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1950, Sept., v. 2, No. 2, 221–35, 2 figs. [14 refs.]

The authors discuss the epidemiology of toxoplasmosis, and especially the question of reservoir hosts and transmission. They point out that among the numerous animals infected under natural conditions, rats and other murines would appear to be the most likely carriers, especially in the latent phase of the disease. They themselves were the first to examine wild murines of Germany by serological methods, using the Sabin-Feldman dye test, which revealed a toxoplasmic infection in 7 out of 49 field mice and in 3 out of 13 wild rats. They also succeeded in passaging the infection from the wild mice to rats and hamsters.

The authors then describe experiments in which they were able to reproduce the intra-uterine transmission from pregnant female dogs and rats to their offspring. They also transmitted the disease to rats orally with the urine and faeces from an infected mouse, and obtained evidence of transmission to suckling rats through the milk of their mother.

The major part of this paper deals with the transmission of toxoplasmosis through ectoparasites, carried out experimentally using white mice infected by the intravenous route as donors, rat-fleas (*Nosopsyllus fasciatus*) as vectors, and other rodents as recipients. The use of fleas as vectors was determined by observed cases in which human toxoplasmosis was preceded by flea bites. The examination of the peripheral blood of infected mice at various intervals of time revealed the presence of free toxoplasms at different periods, especially about 24 hours before the death of the animals. By diluting the inoculum it was further established that white mice can be successfully infected with a few or even a single parasite. From these observations it followed that a blood-sucking insect fed at the appropriate moment might pick up the infection and transmit it to another host.

This possibility was put to experimental test. In the first place, it was shown that fleas fed on infected mice became infected, as was demonstrated by positive results of intraperitoneal inoculation of clean rats and mice with the emulsified insects. As to the method of transmission, attempts to produce an infection by allowing infected fleas to bite the rodents failed, but injection of teased-up fleas produced positive results. It was further proved experimentally that the infection can be transmitted to mice *per os*, either by introducing a suspension of teased-up fleas or by giving the whole insects to them as food. However, it is thought that under natural conditions transmission to a new host takes place by contamination. *C. A. Hoare*

WESTPHAL, A. & MÜHLPFORDT, H. Untersuchungen über Wesen und Fehlerquellen des Toxoplasmose-Serofarbtestes nach SABIN und FELDMAN. [**Investigations on the Nature and Drawbacks of Sabin and Feldman's Dye Test for Toxoplasmosis.**] *Ztschr. f. Hyg. u. Infektionskr.* 1950, July 26, v. 131, No. 4, 423–34.

The authors give a detailed critical analysis of SABIN and FELDMAN's dye test (*Science*, 1948, Dec. 10, 660) for the diagnosis of human toxoplasmosis, based on their own experience in the use of this method.

The principle of this test is as follows. Free toxoplasms from the peritoneal exudate of infected mice are stainable with alkaline methylene blue, but when placed in contact with specific immune serum in the presence of normal serum (known as "activator") they remain unstained. For the test, the toxoplasms

are suspended in normal serum, the suspension is mixed with serial dilutions of the serum to be tested for the presence of immune bodies, and the mixture is kept for one hour at 37°C. The dye is then added to a sample of the mixture, which is examined microscopically, to determine the dilution (*i.e.*, titre) of immune serum at which 50 per cent. of the parasites remain unstained.

The authors discuss various sources of error in this test and the remedies for overcoming them. It is pointed out that the staining of the parasites can also be inhibited by some normal sera, only 20 per cent. of which are suitable as activators and should be selected accordingly. Moreover, the non-specific stain-inhibiting effect of normal serum increases with time, therefore it should be used fairly fresh. (The potency of activator serum is retained up to 10 days at 0°C.) While the specific antibody is thermostable, the activator is thermolabile, therefore normal serum need not be inactivated but immune serum should be inactivated to avoid non-specific reactions. It was found that the titre of specific antibody in whole blood remains unimpaired for 2–3 days in the ice-chest if it is kept undisturbed, otherwise the blood soon becomes inactive. However, inactivated immune serum retains its titre for some days and should therefore be used whenever it is necessary to send test sera by post.

The phenomena taking place in the dye test are regarded as colloidal reactions. It is thought that the proteins from the activator and immune sera are deposited on the body of the parasite, where they combine to form a protective coating which is impermeable to the stain. *C. A. Hoare*

BLANC, G. & BRUNEAU, J. Préparation d'un sérum animal neutralisant le virus de la toxoplasmose. [**Preparation of Animal Serum for the Neutralization Test in Toxoplasmosis.**] *Bull. Acad. Nat. Méd.* 1950, v. 134, Nos. 11/12, 240–44, 2 figs.

The authors point out that Sabin's intradermal neutralization test for toxoplasmosis is sometimes difficult to interpret and requires the use of controls for comparison of the reactions. They therefore carried out a number of experiments with large animals in the hope of producing in them a more potent neutralizing serum for the test. In these investigations sheep, goats and camels were repeatedly inoculated with toxoplasms recovered from experimentally infected ground squirrels (*Xerus getulus*) and gerbils (*Meriones shawi*). While in the camel the inoculation produced no reaction whatever, in the sheep and goat the first inoculation provoked a local reaction accompanied by fever, but subsequent reinoculations are without any reaction.

Numerous neutralization tests carried out on rabbits with the fresh sera of the above-named animals always produced positive results. There was a total protection when the parasites are introduced in dilutions from 1 : 3,000 to 1 : 100, but only partial or none in dilutions from 1 : 40 to 1 : 10. Sera diluted to 1 : 20–1 : 50, as well as those kept longer than a week, only afforded slight protection, whereas fresh serum desiccated *in vacuo* in the cold retained its neutralizing power practically undiminished.

It is concluded that neutralizing serum for use in Sabin's test can be prepared from large adult animals, such as sheep, goat and camel. *C. A. Hoare*

SABIN, A. B. & FELDMAN, H. A. **Persistence of Placentally Transmitted Antibodies in Normal Children in relation to Diagnosis of Congenital Toxoplasmosis.** *Pediatrics.* Springfield, Ill. 1949, Nov., v. 4, No. 5, 660–64.

Since the diagnosis of congenital toxoplasmosis is based on serological tests, it is important to know how long the placentally transmitted antibodies persist in normal children. This question was studied in the normal children of 3

mothers who had previously given birth to congenitally infected children. The presence of toxoplasmic antibodies was determined by the dye-test and by the complement fixation test in the normal children, and these were compared with corresponding tests of the sera of the mothers and their infected children.

The results, which are set out in 2 tables, indicate that both the neutralizing and complement-fixing antibodies are transmitted to the normal child. At birth the titres are practically the same as in the mother, and they persist in almost the same concentration during the first 6 weeks of life. At the age of 3 months the titre of the dye test dropped from 1 : 128 to 1 : 16 and the complement fixation titre from 1 : 16 to 1 : 4. At 4½ months the corresponding titres of the mother's serum were still unchanged (1 : 256 and 1 : 16) but the child's serum had a dye-test titre of 1 : 4 and a negative C.F. test at 1 : 2. In some cases the presence of small amounts of the neutralizing antibody could still be detected in normal children up to 9 months after birth. These results were confirmed by tests on children with neurological disturbances of unknown aetiology, whose mothers had toxoplasmic antibodies. In these children the antibodies did not persist after the fourth month of life, whereas in infected children they persisted up to 9 months. It is concluded that " The absence of C.F. antibody during the first six weeks of life from the serum of a child who has a high titer of neutralizing antibody and whose mother has high titers of both C.F. and neutralizing antibody should suggest active infection with *Toxoplasma.*" *C. A. Hoare*

ENTOMOLOGY AND INSECTICIDES : GENERAL

JOHNSON, C. G. **The Comparison of Suction Trap, Sticky Trap and Tow-Net for the Quantitative Sampling of Small Airborne Insects.** *Ann. Applied Biol.* 1950, June, v. 37, No. 2, 268–85, 8 figs. [12 refs.]

Catches of small insects from a suction trap were found to be more consistent at all wind speeds compared with results from a sticky trap and a stationary aerial tow-net. The sticky trap gave poor results at wind speeds below 3 mph and the tow-net below 7 mph. The author considers that the suction trap gives a more accurate picture of the aerial density of small insects than is obtainable by other methods, although the errors of the trap have yet to be defined. *M. T. Gillies*

DE MEILLON, B. **The Relationship between Ectoparasite and Host. IV—Host Reactions to the Bites of Arthropods.** Reprinted from *Leech.* 1949, Aug., 43–6, 2 figs. [29 refs.]

The effects of arthropod bites on man and animals can be classified into skin reactions, which may be immediate or delayed, generalized systemic effects and persisting cellular changes. Immediate skin reactions are considered to be due to sensitization to a specific antigen contained in the saliva. Immunity to the effects of bites is acquired by frequent exposure and is reflected in the relative indifference of the inhabitants of a region, compared with newcomers, to the local insects. The author draws attention to the reported effect of thiamine in relieving and preventing insect bites. His own experiments with rats deficient in thiamine showed that skin reactions following tick bites were far more severe than in normal rats. The delayed skin reaction, the formation of a local papule some 24 hours later, is also caused by a constituent of the saliva but is non-specific and immunity is not acquired.

Ixodid ticks, by reason of the prolonged period of attachment to the host, induce a more marked immune response and in South Africa residents never suffer from the intractible "itch-bumps" that plague newcomers. With insects such residual papules are not seen, but recent work by ALLEN (*Amer. J. Path.*, 1948, v. 24, 367) has demonstrated histological changes of the nature of foreign body or inflammatory reactions following mosquito bites and persisting for up to two years. Tick paralysis is thought to be caused by the remote action of a toxin secreted by the female adults while feeding. In countries such as South Africa, where it is only the larval ticks that bite man, tick paralysis is unknown. *M. T. Gillies*

TUXEN, S. L. **The Harvest Mite,** *Leptus autumnalis*, **in Denmark. Observations made in 1949.** Reprinted from *Saertryk af Ent. Medd.* 1950, v. 25, 366–83, 11 figs. (1 map).

The endemic rash "*Augustknuderne*" which occurs in the town of Thisted (Jutland) and in no other Danish town is due to attack by larvae of *Trombicula autumnalis* Shaw. [*Leptus* was the generic name applied to Trombiculid larvae before their adult form had been established.] The occurrence of the rash was reported in 1874 and since then attacks have become so severe as to cause the 10,000 inhabitants of Thisted virtually to live indoors in August ; 400 pustules may be found on one person who spends a day in his garden. The mites are most numerous on warm, calm afternoons and evenings on shaded lawns. It seems likely that their most usual host is the blackbird (*Turdus merula* L.) ; up to 700 mites can be found round the anus of one such bird. If birds are the most common host of the mites, the slowness of their spread round Thisted is very remarkable.

The author attempted to control mites in gardens and claims to have been successful with 1 per cent. and 0·5 per cent. water solutions of the spray Midol-Thiol (Midol, Copenhagen). It is not entirely clear what dosage was used but other less successful sprays were applied at the rate of "as much liquid as would cover the surface in a layer of 1 mm." Midol-Thiol is stated to be :—

Hexachlorcyclohexane [BHC]	2·7 per cent.
Azobenzene	4 ,, ,,
Parathion	0·3 ,, ,,
Trichlorethylene, methyl cellulose and water ...	93 ,, ,,

The author feels, rightly, that his figures are not really adequate and that wholesale spraying with BHC is in any case rather rash. A short account of the chaetotaxy of the Danish *Trombicula* mites is also given. *J. H. Sudd*

IRIARTE, D. R. Contribución al estudio de las Ceratopogoninas Hematófagas Senaladas en Venezuela. [**Study of the Haematophagous Ceratopogoninae recorded in Venezuela.**] *Bol. Laboratorio Clínica "Luis Razetti"*. Caracas. 1950, May, v. 15, Nos. 31/32, 344–413, 13 pls. [Refs. in footnotes.]

MEISSNER, E. Die "Rattenschwanzmade" der Schwirrfliege (Eristalis tenax) als Schmarotzer im menschlichen Darm. [**The "Rat-Tailed Larva" of the Hover-Fly** (*Eristalis tenax*) **as a Parasite in the Human Intestine.**] *Med. Klin.* 1950, Nov. 17, v. 45, No. 46, 1474–5.

The following is a translation of the author's summary :—

A case is described of *Eristalis tenax* larvae appearing in the human large intestine. The larvae were passed alive from the anus after anthelminthics and purgatives had been given. The source of infection could not be determined with certainty. *H. J. O'D. Burke-Gaffney*

ISRAELS, S. & SHUMAN, B. **Myiasis Dermatosa in Infancy.** *Pediatrics.* Springfield, Ill. 1949, Nov., v. 4, No. 5, 665–9, 2 figs. [13 refs.]

Two cases of cutaneous myiasis are reported ; both were in infants of two months. Spots appeared on the neck in one case and on the face, neck, abdomen, back and groin in the other. These developed into what appeared to be pustules, but from them larvae emerged or were squeezed out, after which the lesions healed completely. Both children lived in rural Manitoba and had slept out of doors. In one case the larvae were collected and placed on earth. The flies emerged in 12 days and were identified as *Wohlfahrtia vigil.*

This fly deposits its larvae on the skin of a variety of hosts, including man : they burrow into the skin where they mature in 6 to 9 days and when they emerge they fall on to the earth where they develop into the pupal stage in about 12 days.

Other flies that cause cutaneous myiasis in man include two other species of *Wohlfahrtia*—*W. magnifica* and *W. meigenii* ; another species of the family *Sarcophagidae, Sarcophaga haemorrhoidalis ; Gastrophilus haemorrhoidalis ; Dermatobia hominis, Hypoderma lineatum* and *H. bovis ;* and *Cochliomyia americana* and *C. macellaria.*

G. haemorrhoidalis causes a form of creeping eruption in man. *D. hominis* lays its eggs on other insects which feed on man ; the warmth from the skin hatches the eggs from which larvae emerge and enter the skin of their new host.

L. E. Napier

DONOSO BARROS, R. & CAMBIAZO M., C. Un caso de myasis digestiva por larvas de Psychoda sp. [**A Case of Intestinal Myiasis from the Larvae of** *Psychoda* **sp.**] *Rev. Med. Chile.* 1950, July, v. 78, No. 7, 471.

THOMAS, I. M. **The Reactions of Mosquito Larvae to Regular Repetitions of Shadows as Stimuli.** *Australian J. Sci. Res.* Ser. B. 1950, Feb., v. 3, No. 1, 113–23, 3 figs. [12 refs.]

Culex fatigans larvae exposed to changes in light intensity, responded at first by diving to the bottom, but as the stimulus was regularly repeated the response became less marked and after a certain number of times was completely inhibited. Other stimuli such as water vibration and mild electric shocks also elicited this reaction. Inhibition of the response was delayed in the case of large groups of larvae, presumably owing to the mechanical disturbance of one or two abnormally sensitive individuals. Tolerance to the stimulus was attained much more rapidly with later instars, which was attributed to their greater need for oxygen and consequent reluctance to leave the surface.

M. T. Gillies

CHOW, C. Y. **Mosquito Studies in China, Past and Present.** *Mosquito News.* 1950, Sept., v. 10, No. 3, 134–7. [23 refs.]

A review of the literature.

See also p. 181, VAN SOMEREN & MCMAHON, **Phoretic Association between** *Afronurus* **and** *Simulium* **Species.**

PORTER, J. E. & HUGHES, J. H. **Insect Eggs transported on the Outer Surface of Airplanes.** *J. Econom. Entom.* 1950, Aug., v. 43, No. 4, 555–7.

The insects were not of medical importance. [See also *Bulletin of Hygiene,* 1949, v. 24, 883.]

WORLD HEALTH ORGANIZATION. TECHNICAL REPORT SER. No. 4. **Expert Committee on Insecticides. Report on the First Session. Cagliari, 10–15 May 1949.** 46 pp., 2 figs. Geneva. 1950, Oct. [2*s*. 3*d*. ; $0.30.]

The terms of reference of the Expert Committee were, briefly : to advise the Expert Committee on Malaria on specifications of (1) international standards for insecticides and formulations of them for use against insect vectors of disease ; (2) spraying equipment, (3) methods of disinfesting ships and aircraft ; and (4) any other measures to prevent the introduction of anophelines into areas free from them.

The first meeting of the Committee was held in Sardinia and drew on the experience of the organization there (ERLAAS) which, under the joint auspices of the Italian Government and the Rockefeller Organization, is trying to eradicate anophelines from the Island. The following matters were transacted at the first meeting.

A specification for DDT was drawn : and methods for determining the requirements are given in detail in an appendix.

Some preliminary points were made in connexion with specification of other insecticides and the labelling and formulation of them.

Specifications for sprayers (both shoulder or knapsack type and hand-sprayers) were outlined on the basis of the best existing types. Some desirable technical improvements were also noted.

The best methods for disinfestation of ships, evolved from experience in Sardinia, were outlined.

The recommended methods of disinfesting aircraft, before take-off, in the air or after landing, are given ; this section followed the report on the subject by Dr. J. DUGUET [see this *Bulletin*, 1950, v. 47, 410]. Some general points on organization of quarantine measures of this type were recorded.

Finally, the opinions of the Committee were recorded on the following subjects : rôle and limitations of insecticides in house-fly control, interchange of information on insecticides, and the necessity for forming a panel of experts on insecticides (the members of which could be called upon for consultation on specialized local problems). *J. R. Busvine*

PAGAN, C. & HAGEMAN, R. H. **Determination of DDT by Bioassay.** *Science*. 1950, Aug. 25, 222–3, 1 fig.

A method is described in which guppies (*Lebistes reticulatus*) are used in the bio-assay of DDT. Mortality counts after 24 hours in concentrations from 0·025 to 0·200 part per million of technical DDT in water ranged from 15 to 90 per cent., and the data gave a straight line on log. probability paper. Experiments were performed on the determination of DDT on vegetables ; the DDT was extracted with acetone, as benzene is toxic to the fish. The acetone solutions, suitably diluted, when tested showed good recoveries, with an error within the limits of biological methods.

When diluted milk was used as a test medium in order to detect traces of DDT, erratic results were obtained. The authors state that in some way the milk fat slowed down the rate of penetration or poisoning action of DDT and necessitated an exposure of 48 hours, which led to high mortality in the controls. The presence of the milk fat will decrease the percentage saturation of DDT in the solution and hence longer exposure will be necessary. Thus different amounts of milk fat in various samples will produce erratic results. The authors conclude that the inconsistent results indicated that some factor other than DDT was toxic to the fish, which is substantiated by the fact that on occasions when control mortality was low, the kill in treated samples was proportional

to the concentration of DDT. Bacteriostatic and surface-active agents, aeration, and homogenization were of no benefit in producing consistent results. *T. E. Fletcher*

MALAYA, FEDERATION OF: MALARIA ADVISORY BOARD. Circular No. 6. **DDT & BHC (Gammexane) for the Control of Mosquitoes and other Insects.** 1950, July, 6 pp.

This circular is issued as a guide to persons likely to use insecticides in Malaya. The properties and formulations are briefly described; wettable powder is advised for house-spraying and essential details of apparatus, application and dosage are given. Costs in Malaya are referred to. As a larvicide, DDT in oil of high spreading power can be applied to still water by means of an ejector, obtainable from the Shell Company. The final paragraph is an outline of the value and formulations of insecticide for use against other domestic insects.

[Altogether an accurate guide for local conditions with a warning that "much has still to be learnt."] *R. Ford Tredre*

SASSE, B. E. **DDT in Alcohol as a Larvicide for *Aedes aegypti* Control.** *Mosquito News.* 1950, Sept., v. 10, No. 3, 144–9, 5 figs.

DDT is used in Peru as a larvicide for extermination of *Aëdes aegypti*. A saturated solution of DDT (approximately 2 per cent.) in 95 per cent. alcohol is added to household water containers in the proportion of 1 ml. per 6 litres of capacity. This, however, does not affect the potability of the water.

The author investigated in the laboratory the minimum effective dose, the best method of application, and the influence of the material of the container. He found that 1 drop of 2 per cent. DDT-alcohol solution per litre of water was as effective as 7 drops per litre in preventing the larvae from pupating for a period of 11 weeks when the containers were emptied and refilled with water each week. The material of the containers, baked clay, wood or cement did not influence the residual action of the insecticide. The addition of DDT solution at the standard rate to the water, or rinsing the container when it was empty with the 2 per cent. solution, had similar effects. The larvae begin to die after 2 hours, and within 36 hours 100 per cent. mortality occurs. It was found that the baked clay container can be treated and stored for at least 14 weeks and still be effective in killing the larvae, provided it is first washed with water to remove the dust before being used.

The author concluded that the field dosage of 1 ml. of the 2 per cent. DDT alcohol solution per 6 litres of water capacity is to be recommended, to assure a margin of safety even though smaller amounts were equally effective. Similarly the interval between treatments recommended is 4 to 5 weeks though a period of 6 weeks is effective. *T. E. Fletcher*

PRATT, J. J., Jr. & BABERS, F. H. **Cross Tolerances in Resistant Houseflies.** *Science.* 1950, Aug. 4, 141–2.

Some strains of house-flies (*Musca domestica*) resistant to DDT and its analogues are resistant to other chemically unrelated insecticides. Selection experiments were carried out by the authors to determine whether resistance can be developed to a number of compounds simultaneously.

A strain of flies selected in the laboratory for DDT resistance was divided into two lines, in one of which selection with DDT continued while the other was selected with a mixture of insecticides containing DDT, methoxychlor, chlordane, lindane, toxaphene and pyrethrins, dissolved in cyclohexanone.

After selection for 11 generations both lines were found to be more resistant than a normal laboratory strain to DDT, to the insecticide mixture, and to the individual components of the mixture (see table).

Insecticide	Quantity Sprayed (gm./1,000 cu. ft.)	Strain and percentage Mortality		
		Normal	Selected with DDT	Selected with mixture
DDT	5·555	99	0·3	1
Methoxychlor	2·222	97	4	1
Chlordane	0·556	98	8	7
Lindane	0·167	100	72	61
Toxaphene	0·556	100	69	68
Pyrethrins	5·555	70	3	1
Mixture	Each component in above quantity	100	99	91

It is suggested that resistance to compounds other than those for which selection has taken place is due to increased vigour, not to the functioning of a protective mechanism. *C. M. Harrison*

JAUJOU, C., CAMAIN, R. & ADAM, J. P. Apparition en Corse de mouches domestiques résistantes au DDT. [**Appearance in Corsica of Houseflies resistant to DDT.**] *Bull. Soc. Path. Exot.* 1950, v. 43, Nos. 7/8, 490–96. [30 refs.]

HOCKING, B., TWINN, C. R. & MCDUFFIE, W. C. **A Preliminary Evaluation of some Insecticides against Immature Stages of Black-Flies (Diptera : Simuliidae).** Reprinted from *Scientific Agric.* 1949, Feb., v. 29, 69–80, 10 figs. on 5 pls.

The experiments were made at Churchill, Manitoba, in June and July 1947. Suitable streams, infested with *Simulium*, were chosen, of a type which facilitated calculations of flow and applications of insecticide. Sixteen tests were done ; in two streams the treatments were applied by aerial spraying and the remainder were treated from the ground. Seven tests were done with 5 or 10 per cent. DDT in fuel oil, which proved very effective. Other treatments were : chlordan in fuel oil, DDT wettable powder and emulsions of DDT, *gamma* BHC, pyrethrum and chlorinated camphene. On the whole, DDT was most successful in controlling *Simulium* ; *gamma* BHC and chlordan were less effective and pyrethrum and chlorinated camphene were least efficient. DDT in fuel oil was particularly effective by air spray. Treatments of 0·26 and 0·48 lb. DDT per acre completely eliminated blackfly larvae from the treated streams and prevented reinfestation for the season. The superiority of air spray application may have been due to continual seepage of DDT into the stream from the contaminated banks.

Ground applications of DDT were slightly less effective. The following methods were used : hand sprayers, dropping bottles and gravity dispenser. The authors consider the last method could be profitably developed.

The effective applications were calculated to give a " dosage " of 1·5 p.p.m. / minute, or 1 in 10 million for 15 minutes. In addition to killing *Simulium* larvae, the DDT killed a large number of other arthropods, of which the authors give sample records. However, the treatment appears to be safe to fish in the streams, though the DDT might build up toxic concentrations in pools and lakes into which the streams flow. *J. R. Busvine*

DE JONG, J. R. **Field Method for the determination of the Particle Size of Oil Mists.** *Ann. Applied Biol.* 1950, Sept., v. 37, No. 3, 516–26, 5 text figs. & 3 figs. on pl.

COLONIAL PRODUCTS ADVISORY BUREAU (PLANT AND ANIMAL). **Consultative Committee on Insecticide Materials of Vegetable Origin. Report of the Standing Sub-Committee on Methods of Analysis of Vegetable Insecticides on the World-Wide Collaborative Analysis of Pyrethrum Flowers 1948–1949** [BRAY, G. T., Chairman]. ii+63 mimeographed pp., 1 fig. 1950. London. [4*s*.]

Several methods to determine pyrethrin I and II in pyrethrum flowers were evolved up to 1938. Each method, though of use in comparative studies of samples, gave different absolute values of pyrethrins. The Sub-Committee, referred to above, organized collaborative work with 42 workers in all continents in order that universal agreement could be reached on a specific method. Two samples of flowers were analysed by three modified methods, namely the Seil Method, the Mercury Reduction Method and the Ripert Method for pyrethrin I and II. Details of the three methods to be followed exactly are set out in an appendix. The results were statistically analysed, and the apparent pyrethrum content of the samples, the precision of the methods, the personal and inter-laboratory errors, effect of experience, and the effect of geographical location, were discussed. The collaborators' general remarks are included in another appendix.

The investigation showed that the Ripert method gave less concordant results than either of the other two methods, and was dismissed from further consideration. The Sub-Committee found it impossible to recommend that either the Seil or Mercury Reduction method should be adopted preferentially as a standard method for analysis of pyrethrum flowers. The investigation has defined "the practical limits to which flowers can be bought and sold with reasonable chance of agreement between buyer and seller." With complete absence of errors in sampling, whether the Seil or the Mercury Reduction method is used, a difference of 0·3 between determinations carried out by two laboratories should not be regarded as significant for flowers containing between 1 and 2 per cent. total pyrethrins. It is essential that the same method of analysis be stipulated in a contract between buyer and seller.

T. E. Fletcher

CHAMBERLAIN, R. W. **An Investigation on the Action of Piperonyl Butoxide with Pyrethrum.** *Amer. J. Hyg.* 1950, Sept., v. 52, No. 2, 153–83, 6 figs. [20 refs.]

The obvious advantages of the insecticide pyrethrum have been considered to be offset by its lack of permanence ; however, recent studies have shown the mixtures of pyrethrins with the synergist piperonyl butoxide have remained effective for 131 days (DOVE, *Amer. J. Trop. Med.*, 1947, v. 27, 339). More investigation of the action of this synergist seems desirable, and the following study has been done in three parts :—

i. *Residual Panel Studies.*

Houseflies were exposed to plywood panels sprayed with kerosene solutions to give either 200 mgm. /sq. ft. piperonyl butoxide, or 10 mgm. /sq.ft. pyrethrins, or a combination of the two. The flies exposed to either the pyrethrins or the synergist alone showed no knockdown within an hour, whereas the combination caused a complete knockdown in 15 minutes. If the flies were exposed to the pyrethrin panel first and then to the synergist, little knockdown occurred ; and if there was any delay between the exposures, there was no effect. On the

other hand, a preliminary exposure to synergist followed by exposure to pyrethrins, at any time up to 3 hours, caused almost as rapid a knockdown as the "combination" panel.

A possible explanation was that the piperonyl butoxide remained on the flies' feet and dissolved more pyrethrins off the second panel, in the double exposure. But experiments in which other pyrethrin solvents were substituted for the piperonyl butoxide did not achieve the same result. It is concluded that the action of the synergist is pharmacological and, at present, unexplained.

Since the separate exposures to synergist first and pyrethrins afterwards gave practically the same result as the combination panel, it was possible to use this method for testing the relative deterioration of each component with ageing. Experiments of this type showed that the loss of effect was due to the deterioration of the pyrethrins. This deterioration did not occur (over the period of test, 59 days) with the "combination" panel. Therefore the piperonyl butoxide appears to have some stabilizing influence on pyrethrins, *as well as* its synergistic effect.

ii. *Application tests*

Houseflies were anaesthetized by carbon dioxide and secured in an apparatus which allowed very small quantities of oil solutions of insecticides to be applied, either to the head or abdomen. Fine pipettes were used which could apply quantities from 0·004 to 0·1 cubic millimetre. These very small amounts did not spread far on the fly's integument.

The tests showed that solutions of pyrethrins and piperonyl butoxide, both of which were innocuous separately, caused paralysis when applied together. Furthermore, a similar paralysis was effected if the synergist was applied to the head and the pyrethrins to the abdomen. It is clear that the action of the synergist is not merely to accelerate penetration of the pyrethrins. It is suggested that the most likely explanation is that piperonyl butoxide inhibits a de-toxifying mechanism.

iii. *Enzymatic studies*

In some cases it has been noted that pyrethrins are more effective at lower than at higher temperatures. The author did some tests with houseflies exposed to treated plywood panels and found this effect occurred in his experiments with pyrethrins *but not* with the pyrethrin-synergist combination. A possible explanation is that the low temperature slowed down an enzymatic de-toxifying process (which was so severely inhibited by the synergist, that the retardation effect was unimportant).

Lipase is suggested as the enzyme possibly involved ; this would attack the ester linkage in the pyrethrin molecule. A series of careful manometric experiments were made with fat-free extracts of house-flies and cockroaches. The following results emerged : the lipase present in the insect extracts was able to hydrolyse pyrethrins, though at a much slower rate than it attacked other substances, such as certain esteric emulsifiers. (This may have been due to the lower water-solubility of the pyrethrins and the particular *in vitro* conditions.) Addition of piperonyl butoxide to the insect extract plus pyrethrins slowed down the hydrolysis by about 25 per cent.

However, extract from cockroaches, treated with piperonyl butoxide before death, was just as active as extract from untreated insects. Furthermore, another experiment was made with a variety of synergists and three non-synergic bodies. All of them reduced the rate of hydrolysis by the lipase in insect extract ; and the relative reduction was not related to efficiency of the synergists. Indeed, the non-synergic toluene had quite a pronounced effect.

The author concludes that it is possible that lipase action is concerned in pyrethrum poisoning of insects [but the reviewer considers the evidence very slender]. *J. R. Busvine*

SOAP. New York. 1950, Aug., v. 26, No. 8, 106–9, 133–9. **Allethrin Symposium. General Nature of Allethrin** [McNAMEE, R. W.] p. 106. **Standardization, Analysis and Storage of Allethrin** [MOORE, J. B.] pp. 107–8. **Toxicity of Allethrin to Rats** [STARR, D. F., FERGUSON, P. & SALMON, Theodora N.] pp. 108–9. **Allethrin with Synergists** [JONES, H. A., SCHROEDER, H. O. & INCHO, H. H.] pp. 109, 133–9, 4 figs.

Allethrin is a name, proposed in America, for allyl cinerin, which is a compound analogous to the pyrethrins. Though the word refers to the absolutely pure substance, complete purity has not been achieved and the usual sample is a commercial product, about 92 per cent. pure (Specific Gravity 1·005 at 20°C. Refractive Index 1·5040 at 20°C.). Chemical estimation of allethrin is not yet standardized ; certain methods used for estimation of pyrethrins are not entirely satisfactory, and work is proceeding on somewhat different lines. Allethrin is somewhat more stable in storage than pyrethrins when at high concentration, but at low concentration it appears to be about the same.

Allethrin appears to have little toxicity to mammals. Rats were fed on a diet containing 0·2 per cent. of it (dosage about 200 mgm./kgm. per day) for 41 weeks and showed no ill effects whatever.

Also, rats were exposed to aerosol containing allethrin, at 2 to 5 times the practical dose, for half an hour daily for 39 weeks ; again there were no signs of poisoning. Other tests were done with allethrin mixed with other insecticides and with synergists, with satisfactory results.

Mixtures of allethrin with four different synergists were compared with pyrethrin-synergist mixtures, against house-flies and against *Blattella germanica*. The results, on LD50 basis, indicated that the allethrin-synergist combinations varied from being nearly equal to being about one-half as effective, against house-flies ; and about one-third as effective against the cockroaches. [See *Bulletin of Hygiene*, 1948, v. 23, 534 ; 1950, v. 25, 164, 293.] *J. R. Busvine*

WILLIAMS, R. W. **NBIN Emulsion vs. EEAY Solution as Body Lice Ovicide.** *Soap.* New York. 1950, Aug., v. 26, No. 8, 117–21.

An emulsion known as NBIN containing 10 per cent. benzyl benzoate, 2 per cent. benzocaine, 1 per cent. DDT, 2 per cent. "Tween 80", and water, and a solution with the code letters EEAY which differs from NBIN by the absence of " Tween 80 " and the substitution of 95 per cent. ethyl alcohol for water, have both given good control of head lice.

A modified NBIN emulsion and EEAY solution, and their individual ingredients, were tested on eggs and adults of the human body louse. After immersion for 10 minutes in the solution, 100 per cent. of eggs of all ages were killed, and good control was obtained after immersion for 5 minutes. The emulsion, on the other hand, gave 100 per cent. kill of eggs 5–6 days old, but only 26·5 per cent. kill of eggs 8–9 days old after immersion for 10 minutes. Benzocaine, although the most active ovicidal constituent of the emulsion, was ineffective against eggs 8–9 days old.

Adult lice were dipped for 10–12 minutes into either the emulsion or the solution and were then transferred to clean gauze. All adult lice were dead

within 6 hours after immersion in the modified EEAY solution ; this was one-fifth of the time taken to give 100 per cent. kill after similar dipping in the emulsion. *C. M. Harrison*

HEWLETT, P. S. & PLACKETT, R. L. **Statistical Aspects of the Independent Joint Action of Poisons, particularly Insecticides. II. Examination of Data for Agreement with the Hypothesis.** *Ann. Applied Biol.* 1950, Sept., v. 37, No. 3, 527–52, 2 figs. [18 refs.]

REPORTS, SURVEYS AND MISCELLANEOUS PAPERS

HATT, R. T. & VILLA R., B. Observaciones sobre algunos mamíferos de Yucatán y Quintana Roo. [**Observations on some Mammals of Yucatán and Quintana Roo.**] *An. Inst. Biol.* Mexico. 1950, v. 21, No. 1, 215–40, 2 maps & 10 figs.

HALL, E. R. & VILLA R., B. Lista anotada do los mamíferos de Michoacán, Mexico. [**Annotated List of the Mammals of Michoacán, Mexico.**] *An. Inst. Biol.* Mexico. 1950, v. 21, No. 1, 159–214, 5 figs. [27 refs.]

NAUCK, E. G. 50 Jahre Hamburger Tropeninstitut. [**Fifty Years of the Tropical Institute, Hamburg.**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1950, Sept., v. 2, No. 2, 151–75, 2 figs. [195 refs.]

An accurate historical record of the important persons who have graced the Hamburg *Tropeninstitut* calls for some comment in this *Bulletin*. Their careers are well known and their work, for the most part, has gone down to history. The story commences with Robert KOCH, who on his return from E. Africa in 1898 was moved to advocate the establishment of a special institute for the study of tropical epidemics, and at this juncture his pupil Bernhard NOCHT appeared on the scene. The ground had been well prepared and the public conscience had been stimulated by the cholera year of 1892. Since that time this master mind had presided over this great continental harbour, so that on his initiative and, following the examples of Liverpool and London, the Senate approved of the foundation of the first tropical institute in Europe on the site of the Seamen's Hospital which had stood on an eminence commanding the Elbe since 1863. This had become a traumatic centre dealing with the many accidents to which harbour workers are so unfortunately prone. Nocht's plan to convert this rather antiquated hospital into a modern Tropical Institute earned a ready assent from the City Senate, in spite, it appears, of some rather forcible opposition directed from Berlin.

With a small staff of assistants, one assistant physician, some pharmacists and a handful of doctors, seconded from the armed services, a start was made. Nocht at the same time retained the office of Port Medical Officer. Soon, however, the necessity of teaching the intricacies of tropical pathology arose and at the same time the laboratories undertook diagnostic work especially in protozoology, helminthology and entomology. So the hospital prospered in the first few years with pleasing results and maintained 55 beds, where planters, business men, seamen and soldiers received special treatment. Three rooms accommodated the laboratory staff and practical instruction was handed out to 18 students. The chief and his assistants occupied two rooms and the

chemists a similar number. The staff at this time consisted of 28 persons, among whom were numbered 4 doctors and 7 sisters. Besides his technical ability, Nocht was endowed with a particular flair for choosing his assistants. From the Eppendorf School there emerged an assistant physician—OTTO, and external assistants OLLWIG and ZUPITZA were seconded from the Army. GIEMSA, who attained international fame, was recommended as pharmacist and chemist.

Otto undertook studies on yellow fever in West Africa and Zupitza had assisted KOCH himself in the investigation of plague on Lake Victoria.

H. Werner, who was appointed also to the Institute, returned to the Cameroons in 1914. He did valuable work in malaria, blackwater fever, surgery of elephantiasis, the protozoology of intestinal amoebae and flagellates, relapsing fevers, Malta fever and verruga peruviana, but he left his mark on the scroll of fame by the recognition of " five-day fever " (Febris quintana, wolhynica, more recently popularized as trench fever) in 1916.

Giemsa had already attained a reputation from 1895 to 1898 as Government pharmacist and apothecary in East Africa. Thereafter he worked continuously for 30 years at the Institute and there perfected from the Romanowsky-Nocht-Ziemann stain, the dye that henceforward has borne his name (1902). He also did valuable work on chemotherapy (quinine derivatives, arsenicals and bismuth), and on practical port hygiene, and served upon the hygiene commission of the League of Nations.

FÜLLEBORN, of vivid memory, and also of international fame, served from 1896 to 1900 as a regimental medical officer and had taken part in military operations in S.W. Africa. At this time he was accredited to the Institute and soon established a reputation as helminthologist, employing original and novel methods of investigation to filariae, hookworms, *Ascaris* and *Strongyloides*, while on the domestic side of the school he was an attractive teacher and lecturer, who introduced for the first time cinematographic films to illustrate his subjects. Fülleborn took over the directorship from Nocht for four years till his death in 1934. He was succeeded by MÜHLENS who died suddenly from a heart attack 9 years later. Mühlens was also a Service candidate : this time from the Navy. He first visited the Institute on his return from the China Expedition in 1901 ; thereafter he worked at the Robert Koch Institute from 1906 to 1907 and in 1911 was taken on the permanent staff of the Institute. Mühlens was well known for his investigations on malaria in Palestine and his leadership of the Red Cross Expedition to Russia 1921–1922, and for many other journeys to the Balkans, South America, the Far East and West Africa. His chief contributions were probably the clinical application of Bayer 205 to trypanosomiasis and yatren to amoebic dysentery. After his death the mantle fell on E. G. NAUCK who is most active at present and who has guided the Institute through most difficult times.

In 1904, Martin MAYER was installed as bacteriologist and in 1906 he accompanied Fülleborn to Egypt and E. Africa, and again in 1907–8 went with KEYSSELITZ to the same spot ; later, after the first world war, he travelled with Nauck to Transcaucasia and with Malamos to Crete. His studies have covered a wide field embracing leishmaniasis, spirochaetosis, piroplasmosis, the plasmodia and verruga peruviana. He was the discoverer of *Bartonella muris*. He had to quit Germany in 1938 on political grounds and is still active in Venezuela.

The protozoological department was initiated in 1905 by Fritz SCHAUDINN, then at the height of his fame. Unfortunately he died in 1906 at the early age of 35. His successor v. PROWAZEK became almost equally famous for his studies on rickettsiae, and as the discoverer of inclusion bodies in trachoma.

He also died early in 1915 from a virulent typhus infection accidentally contracted.

In 1917 W. NÖLLER took over this department only to be transferred to Berlin 4 years later to be succeeded by E. REICHENOW who still reigns.

The pathologo-anatomical department was instituted in 1909 under the direction of H. DA ROCHA LIMA, a very distinguished Brazilian who emanated originally from the Instituto Oswaldo Cruz in Rio. His name is known as the man who confirmed the aetiological importance of *Rickettsia prowazeki*, and described characteristic histological changes of the liver in yellow fever. He left for Brazil in 1928 in order to take charge of the great Instituto Biologico in São Paulo. Although FRIEDRICHS had worked on insects since the early days, it was not till 1912 that the definite appointment of entomologist was made, and E. MARTINI was chosen as director of this department, and his studies in many directions are well known. Since his retirement he still resides in Hamburg. The transformation of the old Seamen's Hospital to the modern imposing Institute took place in May 1914.

The story about the activities of the modern members of the Institute belongs to current history. *P. Manson-Bahr*

SIMMONS, S. W. **The Technical Development Division of the Communicable Disease Center.** Reprinted from *Organo Oficial Asoc. Interamericana Ingeniería Sanitaria.* 1949, Jan., v. 2, No. 3, 272–82, 1 fig.

This is a useful short article in that it explains the organization of the Technical Development Division (situated in Savannah, Georgia) of the Communicable Disease Center, whose headquarters are in Atlanta, Georgia. The Center is concerned principally, but not entirely, with those diseases in which the aetiological agent, the vector and the reservoir of infection are known or suspected to be zoological; its field includes the study of protozoan and helminthic diseases, and also of certain bacterial, rickettsial and virus diseases.

The Technical Development Division consists of 7 technical and 2 service branches (dealing with insecticides, control methods, chemistry, equipment, vectors and toxicology) and maintains a branch in Texas at which evaluation of municipal sanitation practices is carried out.

The author gives some details of the results of work done by these branches, much of which has already been made public; this gives an impression of the kind of careful investigation sponsored by the Division.

It is useful to readers, especially those in other countries, to have short notes of this kind to familiarize them with the organization and work of important institutions. *Charles Wilcocks*

ASSOCIATION INTERNATIONALE DU CINEMA SCIENTIFIQUE. Paris. 1950, Oct., 15 mimeographed pp. Liste provisoire des films traitant de sujets de la Parasitologie Humaine et Comparée. [**Preliminary List of Films on Human and Comparative Parasitology.**]

This list was compiled as a result of a circular sent out in March 1950 by the Medical Committee of the International Scientific Film Association in Paris. It is emphasized that the list is preliminary and the promoters ask for supplements and corrections so that a permanent catalogue, with periodical supplements, may be established.

Even in its provisional form, the list should prove of great value to those concerned in teaching parasitology and in epidemiological instruction and propaganda.

The list gives titles of such films available in 11 European countries, in the U.S.A. and Canada and in Australia, Rhodesia, Brazil and Uruguay. Each section is arranged alphabetically by countries and the number of films listed in each country varies from one or two to, for example, 34 (Germany), 21 (France), 17 (U.S.A.) and 14 (United Kingdom).

The list covers such subjects as syphilis and spirochaetes, malaria and sleeping sickness and their vectors, the typhus group, amoebiasis, helminthiasis, plague, insect pests and blood films : some films deal solely with the parasite or vector and others with such matters as epidemiology, clinical features and control of the relevant diseases.

The information given by each country varies somewhat in amount, but in general for each film there is listed the width and length, duration of showing, whether monochrome or coloured, silent or sound (with the languages used), where it is prepared and procurable and a brief outline of the subject matter.

When a permanent list has been established and extended this admirable project should be of increasing value to those who wish to know of and to obtain films in these subjects on an international scale.

H. J. O'D. Burke-Gaffney

SOFIA, F. Considerazioni clinico statistiche su alcuni recenti aspetti della nosografia eritrea. [**Recent Statistics of Disease in Eritrea.**] *Bull. Soc. Ital. di Med. e Igiene Trop.* (Sez. Eritrea.) 1949, v. 9, No. 6, 457–64. [30 refs.] English summary (7 lines).

This paper gives some rather discursive remarks on a few of the diseases seen in Eritrea. *Undulant fever* has increased and is now to be regarded as endemic ; whereas in 1914 and in 1920 there was no case reported and in 1936 two cases, of late years cases have been getting fewer among Europeans but increasing among Eritreans. In 1938 CARDONA on examining 174 sheep and goats [the numbers of each are not stated] found 2·24 per cent. positive to the brucellin test, but in 1943 CILLI and his colleagues found 5 per cent. of goats on the plains and 6·18 per cent. of sheep on the higher levels positive. Of patients treated in hospital many complain of pain in the joints, especially the sacro-iliac ; others show haemorrhagic serous effusions, and bronchopneumonia and pleurisy simulating tuberculosis. *Tuberculosis*, especially pulmonary, is gaining ground ; the spread is fostered by movement of native troops from Libya. *Schistosomiasis* is increasing and at certain foci which have been investigated *Planorbis abyssinicus* and *P. ruppellii* have been found naturally infested. *Ankylostomiasis* is said to have been unknown till 1944 when examination of persons [? the number] taken at random revealed 18·8 per cent. to be passing ova of *Necator americanus*. *Typhus* and *Relapsing fever*, louse-borne, have been diminishing, probably owing to widespread use of insecticides. Figures for 1946 only are given, so that the degree and rate of diminution cannot be stated. In that year, among 1,519 cases of typhus there was a 9·15 per cent. fatality and among 704 cases of relapsing fever 2·7 per cent.

H. Harold Scott

BOLIVIA : MINISTERIO DE HIGIENE Y SALUBRIDAD. División de Endemias Rurales. Servicio en cooperación entre el Ministerio de Higiene y Salubridad y la Fundación Rockefeller. Informe Anual 1949. [**Division of Rural Hygiene. Service and Co-operation between the Ministry of Health and the Rockefeller Foundation. Annual Report for 1949.**] 28 mimeographed pp., 2 maps. La Paz—Bolivia.

The work of this cooperation between the Bolivian Ministry of Health and the Rockefeller Foundation comprises five medical " services " and an

administration section. The five are : yellow fever, malaria, plague, typhus, and hookworm services. Something must be said on each of these.

Yellow Fever Service.—During the year the country was kept free of *Aëdes aegypti* ; vaccinations were performed in the areas of sylvatic yellow fever and investigations were carried out in areas where the disease occurred. At the end of 1948 and the beginning of 1949 there was an outbreak of 15 cases in Canton San Lorenzo on the River Beni. During 1949 there were altogether 94 cases (90 diagnosed primarily by the clinical history) confirmed by examination of viscerotomy specimens ; 45 died. There are in the country 69 viscerotomy posts and from these 497 samples were sent. In 117 localities 21,251 persons were vaccinated ; mosquito control is being maintained.

Malaria Service.—Investigations included spleen and parasite indices of children and data on the effects of DDT. Several hundreds of *Anopheles* were examined to determine the sources of their blood-feeds. It was found that they had fed on horse, cattle, sheep, pig, goat, dog, bird and man. Sixteen per cent. had fed on man. Areas of Cochabamba showed generally a marked reduction in spleen and parasite indices. For example, El convento ; in 1942 the splenic index was 72 per cent., in 1948 it was 24 and in the following year 9·6 ; in Capinota area in the three years 1947–49 the figures were 24, 6 and 3 per cent. respectively. The parasite index for El Convento in the same three years was 10·3, 13·3 and 2·5, and for Capinota 8, 0 and 1·2 per cent. Figures are given for 36 other places.

Plague Service.—A small outbreak occurred in the rural district of Tola Orcko ; among 50 inhabitants three cases were clinically diagnosed, two of them were fatal. They occurred in July and August but did not come to the knowledge of the inspector until December when some rats, suspected of being infected, were caught and sent to the laboratory ; they were, however, declared negative. Anti-rat and anti-flea measures were taken in hand. Of 1,621 fleas identified 1,218 (75·1 per cent.) were *Xenopsylla cheopis* ; the commonest rat found was an atypical *R. norvegicus*, believed to be *R. frugivorus*. A very clear line map shows the rat and flea areas in Bolivia.

Typhus Service.—This was organized in May, 1948, after an outbreak in the city of La Paz where there were 20 cases, two fatal. In 13 other localities there were 39 confirmed cases and four deaths. Another line map indicates 12 other places where patients were seen in 1949. A table names 14 localities and a total of 52 cases, 6 fatal. Of 329 specimens of blood examined at the laboratory by the Weil-Felix reaction 42 were positive and three suspicious.

Hookworm Service.—In Santa Cruz 3,194 children were examined ; 93 (3 per cent.) had no parasites, 2,331 (73 per cent.) had hookworms, 1,870 (59 per cent.) had *Ascaris lumbricoides*, 2,698 (85) *Trichuris trichiura* and 92 (3 per cent.) *Taenia* sp.

Some experiments on delousing by 10 per cent. DDT powder showed that a single treatment was not enough, but a second treatment after a week's interval proved satisfactory.

H. Harold Scott

MEISTER, H. Aerztliches Arbeiten in China 1937–1949. [**Medical Work in China 1937–1949.**] *Schweiz. med. Woch.* 1950, Nov. 18, v. 80, No. 46, 1238–40.

This article is of much interest but not so comprehensive as the title would lead one to suppose. The author tells of his experiences at the Meihsien Mission Hospital, an institute with 130 beds in a town of 80,000 inhabitants. The hospital is well equipped for general and maternity work and for radiography. Apart from the usual diseases of countries abroad, such as malaria, dysentery

(amoebic and bacillary), ankylostomiasis, ascariasis, enteric fevers and occasional outbreaks of cholera, trachoma is common as also is rickets—children are often fed on rice-pap : tetanus infantum is too often met with, syphilis, acquired and congenital, is common, and, of course, during the war a variety of injuries were seen. The author records some exceptional conditions worthy of note. Among these may be mentioned the case of a woman with total prolapse of the uterus which a Chinese " doctor " had treated by scraping the vaginal mucous membrane (without anaesthetic) with shears (or scissors, *Scherbe*) and replacing the uterus ; the vaginal walls grew firmly together thus causing complete atresia but curing radically the prolapse. Later, the woman came to the hospital with haematometra up to the umbilicus. Carcinoma was rarer than in Europe, sarcoma more common; gastric and duodenal ulcer are frequent; pulmonary tuberculosis is widespread ; appendicitis infrequent, among 700–800 operations annually there are on an average three appendicectomies in an acute stage (*à chaud*), three in the quiescent stage (*à froid*) and 3–5 cases of appendix abscess. Vesical calculus is common, and associated sometimes with filariasis and sometimes with avitaminosis A. Foreign bodies in the oesophagus are frequently seen—mostly splinters of chicken bones which have often been impacted for some days before treatment is sought ; sometimes the oesophagus has to be incised for their removal, but mediastinal phlegmon has not been observed. Plastic surgery finds considerable scope, for quarrels and mutilations are fairly frequent. *H. Harold Scott*

HUTTEL, W. L'épreuve judiciaire au poison " Adi " et le poison de flèches des indigènes du Dahomey. [**Medico-Legal Tests for the Poison " Adi " and Arrow Poisons used by the Natives of Dahomey.**] *Rev. Paludisme et Méd. Trop.* 1950, Nov. 15, v. 8, No. 78, 249–53.

BOOK REVIEW

BLANC, François & SIGUIER, Fred. **L'amibiase. Etude clinique et thérapeutique.** [Amoebiasis. Clinical and Therapeutic Study.] Préface de M. le Professeur LEMIERRE. 634 pp., 13 figs. on 7 pls. & 9 charts. 1950. Editeur, L'Expansion Scientifique Française.

This volume, written by two well-known French workers, is concerned with the clinical course and diagnosis of amoebiasis and amoebic dysentery, and with the therapeutics of these conditions. More than half the book is devoted to treatment.

After a general account of the discovery of the causal organism, and of its subsequently disclosed ubiquity, the authors turn to the theories advanced for its seeming pathogenicity in some cases and apparent absence of pathogenicity in others, and to the numerous explanations of the mechanism of the development of pathological lesions in the bowel wall in association with an *Entamoeba histolytica* infection. They affirm their belief that a combination of the parasite's activity and of a concurrent bacillary infection, and suitable intestinal flora, is responsible for this. They consider that the distribution and the histological picture of the lesions support this view, and that other established facts accord with it.

Attention is devoted to the clinical evolution of cases of amoebiasis and of amoebic dysentery. The disease is classified into two stages, the acute and the

chronic, and the authors follow the French practice of subdividing these into a very large number of sub-types based on the symptomatology and clinical manifestations. All these are considered in detail, and the description of them occupies much space. The great differences between the simple amoebic colitis of the temperate climates and the severe amoebiasis with gross manifestations resulting on infection in the tropics are stressed.

In the first part of the book, devoted to the clinical aspect of amoebiasis, there is a lengthy chapter on the mishaps and accidents which may attend emetine treatment. Among these are included digestive upsets, renal disturbances, arterial hypotension with the development of a rapid pulse, peripheral neuritis, and early signs of involvement of the central nervous system ; all these are considered to be minor side-effects. Among the more grave toxic effects are included extensive palsies, myocarditis with disturbances of rhythm and heart function, emetine shock, and fatalities attributable to nervous or myocardial damage. The reasons for the production of toxic side-effects during emetine treatment are discussed ; clear recommendations are set out as to the dosage of emetine which should be given, the mode of its administration, and the conditions under which emetine treatment should be undertaken, if such disasters are to be avoided. The treatment of ambulatory patients with this drug is stated to be unwarrantable. [It is not to be inferred from all this that the authors do not consider emetine to be a valuable drug in the treatment of amoebiasis.]

The second and greater part of the book is devoted to the detailed treatment of the various forms of amoebiasis already described. The scale of treatment, the use of emetine during acute attacks, the value of mixed assault treatments with the better known amoebicidal drugs, the employment of the bactericidal drugs, and the employment of conessine, are all considered. Other aspects of treatment, including attempts at prophylaxis, also receive attention ; and the value of a variety of drugs in palliative and symptomatic relief is referred to.

Emetine and conessine are considered to be " true amoebicides ", in that they destroy amoebae in the tissues ; the arsenicals, the iodoquinolines, and E.B.I. kill vegetative forms of the parasite in the lumen of the bowel. The methods of use and the dosages of these compounds advocated by many workers are given in detail. The various arguments in favour of and against the use of conessine are weighed, and its value in the therapy of amoebiasis is assessed in the light of the authors' personal experience of this drug. The action of conessine is stated to be comparable with that of emetine, but it suffers from the same limitations ; its toxic side-effects do not debar its use in the treatment of suitable cases of amoebiasis.

Such complications of amoebiasis as amoebic infection of the liver, the lungs, the skin, the brain, the genito-urinary system and the spleen are briefly described. At the end of the volume there is an extremely lengthy bibliography which, unfortunately, is marred by numerous inaccuracies and irregularities in presentation ; the volume concludes with a list of proprietary preparations, and their dosage for the treatment of cases of the various forms of amoebiasis. There is no index and there is no table of contents.

This book contains a vast amount of information. It will afford a useful source of reference to those working on the subject and well acquainted with the disease. It is difficult reading, not on account of the language, but on account of the innumerable clinical subdivisions into which amoebiasis is divided. For this reason it cannot be regarded as a convenient source of information for the ordinary practising physician. *A. R. D. Adams*

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